EMISSION FACTOR DOCUMENTATION FOR

AP-42 SECTION 2.4

MUNICIPAL SOLID WASTE LANDFILLS

REVISED

Office of Air Quality Planning and Standards
Office of Air and Radiation
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

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1.0 INTRODUCTION

The document "Compilation of Air Pollutant Emission Factors" (AP-42) has been published periodically by the U.S. Environmental Protection Agency (EPA) since 1972. New emission source categories and updates to existing emission factors to supplement the AP-42 have been routinely published. These supplements are in response to the emission factor needs of the EPA, State, and local air pollution control programs, and industry.

An emission factor relates the quantity (weight) of pollutants emitted from a unit source. The emission factors presented in AP-42 can be used to:

Estimate area-wide emissions;

- Estimate emissions for a specific facility; and
- Evaluate emissions relative to ambient air quality.[1]

The purpose of this report is to provide background information on municipal solid waste (MSW) landfills, the test reports reviewed and used to calculate emission factors, and the models presented in the AP-42 for the estimating of emissions from MSW landfills. This report was revised during the summer of 1997 in order to incorporate additional test data gathered by EPA since the original report was published.

Including the introduction (Chapter 1), this report contains five chapters. Chapter 2 gives a description of MSW landfills. It includes a characterization of the industry, an overview of the different process types, a discussion of emission sources, and a description of the technology used to control emissions resulting from MSW landfills. Chapter 3 is a review of emissions data collection and analysis procedures. The methodology adapted to develop this AP-42 is presented in Chapter 3, including the discussion of the literature search, emission data reports screening, the quality rating system used for test reports and emission factors, and the data used. Chapter 4 describes the pollutant emission factor development, review the data utilized, discusses the protocol methodology, and presents the results of the analysis. Chapter 5 presents AP-42 Section 2.4, Municipal Solid Waste Landfills.

REFERENCES FOR CHAPTER 1.0

1. U. S. Environmental Protection Agency. Technical Procedures for Developing AP-42 Emission Factors and Preparing AP-42 Sections. Office of Air and Radiation. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. March 6, 1992. p. 6.

2.0 INDUSTRY DESCRIPTION

A MSW landfill unit means a discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile.[1] A MSW landfill unit may also receive other types of wastes, such as commercialized solid waste, nonhazardous sludge, and industrial solid waste.[1] Studies conducted by the EPA and State authorities have shown that MSW landfills release air pollutants that may have adverse effects on both public health and welfare. The EPA has proposed that MSW landfills be listed as a source category that causes or contributes to air pollution that endangers public health or welfare.[2] Municipal solid waste landfill emissions, often collectively called landfill gas (LFG), consist primarily of methane (CH_4) and carbon dioxide (CO_2) (roughly 50 percent of each), with trace amounts of more than 100 non-methane organic compounds (NMOCs) such as ethane, toluene, and benzene.[2] In the United States, approximately 57 percent of municipal solid waste is landfilled, 16 percent is incinerated, and 27 percent is recycled or composted.[3]

2.1 CHARACTERIZATION OF THE INDUSTRY

There were an estimated 2,500 active MSW landfills in the United States in 1995.[3] These landfills were estimated to receive 189 million megagrams (Mg) (208 million tons) of waste annually for 1995, with 55 to 65 percent household waste, and 35 to 45 percent commercial waste.[3] The waste types potentially accepted by MSW landfills include (most landfills accept only a few of these categories):

- MSW;
- Household hazardous waste;
- Municipal sludge;
- Municipal waste combustion ash;
- Infectious waste;
- Waste tires;

- Industrial non-hazardous waste;
- Conditionally exempt small quantity generator (CESQG) hazardous waste;
- Construction and demolition waste;
- Agricultural wastes;
- Oil and gas wastes; and
- Mining wastes.[2]

Unlike many other emission source categories (i.e., manufacturing facilities), landfills will generate LFG emissions long after closure (possibly up to 100 years after closure).

2.2 PROCESS DESCRIPTION

Landfill design and operation is normally accomplished by one or a combination of three approaches. These approaches are the area method, the trench method, and the ramp method.[2,4] All of these methods utilize a three-step process that consists of spreading the waste, compacting the waste, and covering the waste with soil. The trench and ramp methods are not commonly used, and are not the preferred methods when liners and leachate collection systems are utilized or required by law.

The area fill method entails placing waste on the ground surface or landfill liner, spreading it in layers, and compacting with heavy equipment. Successive layers are added until a depth of 3 to 4 meters (m) [10 to 12 feet (ft)] is reached. A daily soil cover (i.e., on the top and sides) is spread over the compacted waste. The soil cover can come from other parts of the landfill, or be imported from outside the landfill.[2]

The trench method entails excavating daily trenches designed to receive a day's worth of waste. Successive parallel trenches are excavated and filled, with the soil from the excavation being used for cover material and wind breaks.[2,4]

The ramp method is typically employed on sloping land, where waste is spread and compacted in a manner similar to the area method. However, the cover material is generally obtained from the front of the working face (i.e., from the slope) of the filling operation.[2,4]

The basic landfill cell (i.e., unit, structure) is common to all landfilling methods, and is usually designed to accept a day's waste, after which it is closed, compacted, and covered with soil at the day's end. Figure 2-1 illustrates a sectional view of a sanitary landfill that incorporates a ramp design.[2] Generally, the height of a cell is less than 2.4 m (8 ft), and the working face of the cell can extend to the facility boundaries. Waste densities generally range from 653 to 830 kilograms (kg) per cubic meter (m^3) [1,100 to 1,400 pounds (lbs) per cubic yard (yd^3)] after the waste has been compacted, and range from 1,008 to 1,127 kg per m^3 (1,700 to 1,900 lbs per yd^3) after waste degradation and settling. If site-specific data are not available, a density of 688 kg per m^3 (1,160 lbs per yd^3) is recommended for compacted waste.[5] Daily cover material and depth requirements may vary from State to State. Most States, however, require that at least a 15 centimeter (cm) (6 inch) cover be applied at the end of each day, and a 0.6 m (2 ft) final cover of material capable of supporting vegetation be applied for a completed landfill.[2]

Modern landfill design often incorporates liners constructed of soil (i.e., recompacted clay) or synthetics (i.e., high density polyethylene), or both to provide an impermeable barrier to leachate (i.e., water that has passed through the landfill), and gas migration from the landfill. Soil liners can reduce permeability to 10^{-7} cm (10^{-8} inches) per second, and synthetic liners to 10^{-13} cm (10^{-14} inches) per second.[2]

2.3 EMISSIONS

CH_4 and CO_2 are the primary constituents of LFG, and are produced by microorganisms within the landfill under anaerobic conditions. Carbohydrates from paper, cardboard, etc, which form the major components of refuse, are decomposed initially to sugars, then mainly to acetic acid, and finally to CH_4 and CO_2.[2]

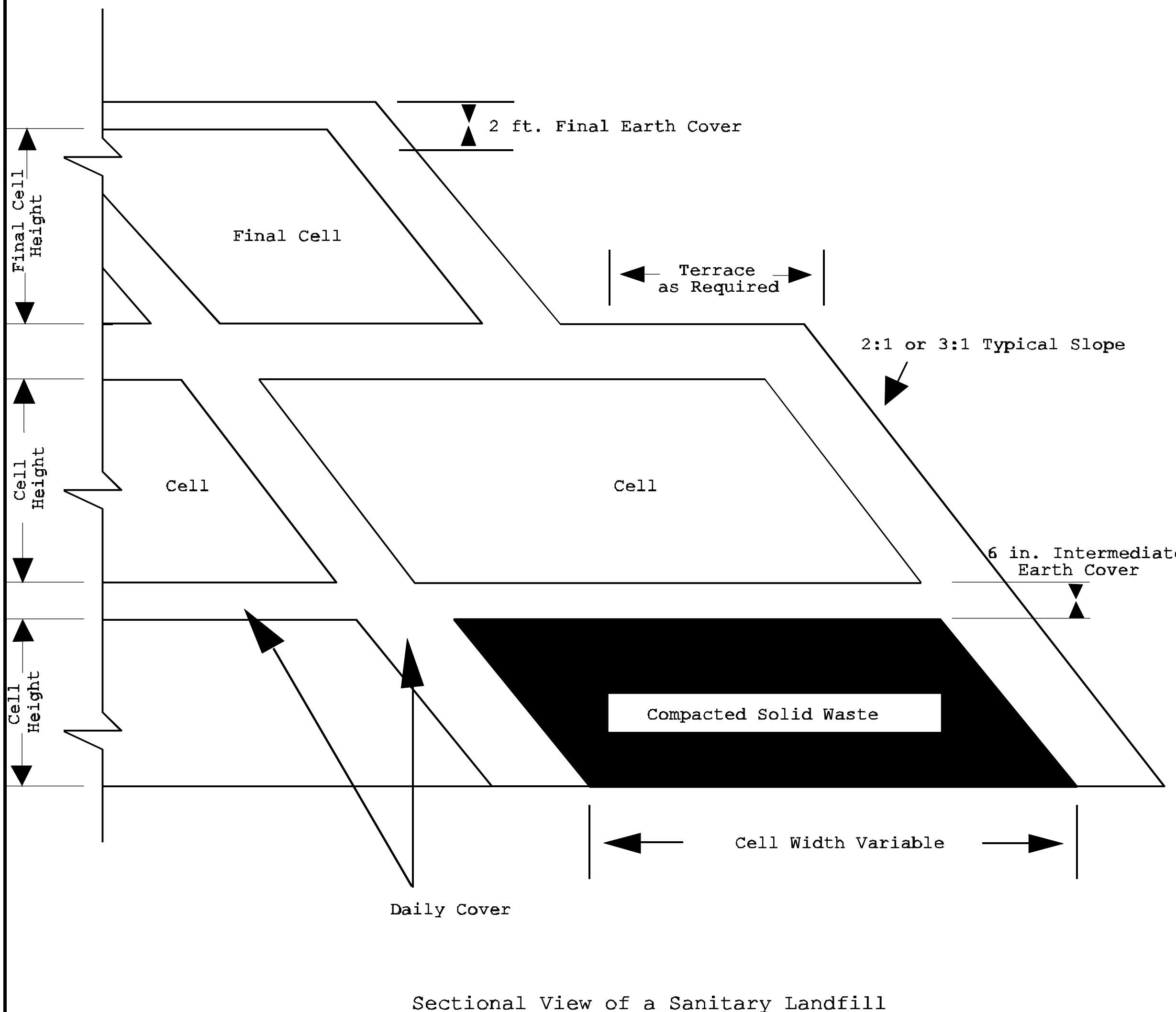


Figure 2-1. Landfill cell design.

Source: Adapted from Reference 2.

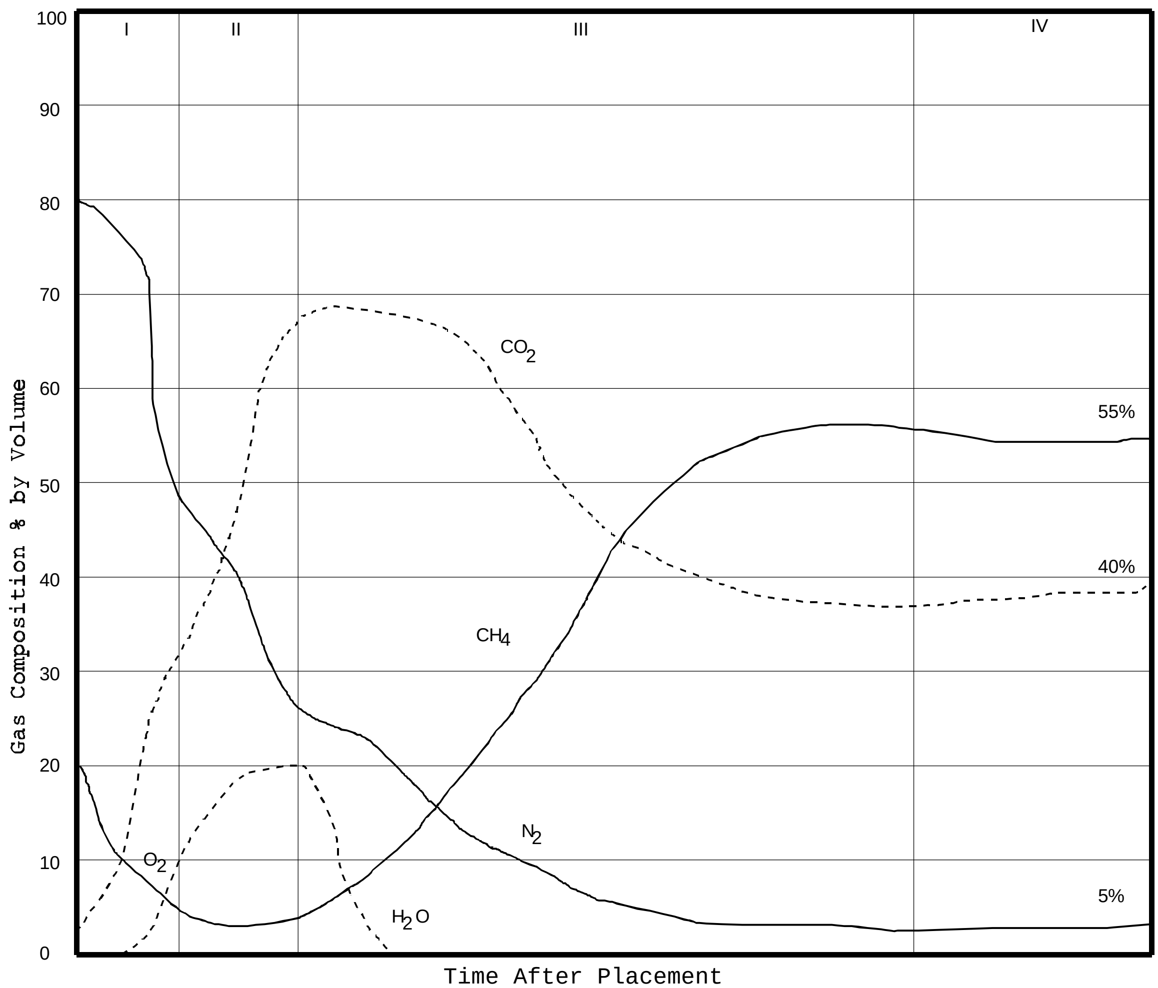
LFG generation, including rate and composition, proceeds through four characteristic phases throughout the lifetime of a landfill. The first phase is aerobic [i.e., with oxygen (O_2) available] and the primary gas produced is CO_2. The second phase is characterized by O_2 depletion, resulting in an anaerobic environment where large amounts of CO_2 and some hydrogen (H_2) are produced. In the anaerobic third phase, CH_4 production begins, with an accompanying reduction in the amount of CO_2 produced. Nitrogen (N_2) content is initially high in LFG in the aerobic first phase, and declines sharply as the landfill proceeds through the anaerobic second and third phases. In the fourth phase, gas production of CH_4, CO_2, and N_2 becomes fairly steady.[2]

The phase duration and time of gas generation varies with landfill conditions (i.e., waste composition, cover materials, design), and may also vary with climatic conditions such as precipitation rates and temperatures. The modelled evolution of typical LFG is presented in Figure 2-2.[2]

Emissions of NMOCs result from NMOCs originally contained in the landfilled waste and from their creation from biological processes and chemical reactions within the landfill.[2]

The rates of emissions from landfills are governed by gas production and transport mechanisms. Production mechanisms involve the production of the emission constituent in its vapor phase through vaporization, biological decomposition, or chemical reaction. Production mechanisms are affected by a variety of factors. Vaporization is affected by the concentration of the individual compounds in the landfill, the physical properties of the individual compounds, and the specific landfill conditions (i.e., temperature and confining pressure). Biological decomposition of liquid and solid compounds into other chemical species is dependent upon:

- The nutrient availability for micro-organisms;
- Refuse composition;
- The age of the landfill;
- Moisture content;



I. Aerobic
II. Anaerobic, Non-Methanogenic
III. Anaerobic, Methanogenic, Unsteady
IV. Anaerobic, Methanogenic, Steady

Note: Time scale (total time and phase duration) of gas generation varies with landfill conditions (i.e., waste composition, and anaerobic state).

Figure 2-2. Evolution of typical LFG.

Source: Reference 2.

- pH;
- Temperature;
- Oxygen availability; and
- Exposure to biological inhibiting industrial waste.[2]

Quantification of the impacts of any of these factors on LFG production is not possible with the state of current knowledge. Chemical reactions are dictated by the composition of the waste, temperature, and moisture content in the landfills.

Transport mechanisms involve the transportation of a volatile constituent in its vapor phase to the surface of the landfill, through the air boundary layer above the landfill, and into the atmosphere.[2] There are two major transport mechanisms that enable transport of a volatile constituent in its vapor phase: molecular diffusion and biogas convection.[2]

As with production mechanisms, transport mechanisms are affected by a variety of factors. Molecular diffusion through a soil cover is influenced by the soil porosity, the existing concentration gradient, the diffusivity of the constituent, and the thickness of the soil. Molecular diffusion through the air boundary layer is affected by the windspeed, concentration gradient, and diffusivity of the constituent. Biogas convection occurs due to pressure changes within the landfill which are influenced by nutrient availability for bacteria, refuse composition, moisture content, landfill age, temperature, pH, oxygen availability, presence of a gas collection system, and biological inhibiting wastes (i.e., industrial wastes). Displacement due to compaction and settlement is dependent upon the degree of compaction, waste, compatibility, and overburden weight (settlement). Displacement can also occur through other mechanisms. Displacement can be influenced by changes in atmospheric pressure. Displacement due to water table fluctuations is affected by the presence of a liner, rate of evaporation, rate of precipitation, and the horizontal versus the vertical permeability.

2.4 CONTROL TECHNOLOGY

The Resource Conservation and Recovery Act (RCRA) Subtitle D regulations promulgated on October 9, 1991, require restrictions on location and operation, design standards, groundwater monitoring, measures of corrective action, closure and post-closure care requirements, and financial assurance standards for landfills. Under these requirements, the concentration of CH_4 generated by MSW landfills can not exceed 25 percent of the lower explosive limit (LEL) in on-site structures, such as scale houses, or the LEL at the facility property boundary.[1] These regulations took effect on October 9, 1993 and apply to all MSW landfills except those owned and operated by a State or the Federal government.[1]

In addition to RCRA Subtitle D regulations, New Source Performance Standards (NSPS) and Emission Guidelines for air emissions from MSW landfills were promulgated in March of 1996. The standards and guidelines are for non-exempt new and existing landfills. The MSW landfills affected by the NSPS/Emission Guidelines are landfills with actual or design capacities equal to or greater than 2.5 million Mg (2.75 million tons). These include new MSW landfills that began accepting waste on or after May 30, 1991, and existing MSW landfills that have accepted waste since November 8, 1987, or that have capacity available for future use.[2] Regulated under the standards and guidelines are "MSW landfill emissions," which include CO_2, CH_4, and NMOCs, some of which are toxic.

The regulation requires that Best Demonstrated Technology (BDT) be used to reduce MSW landfill emissions from affected new and existing MSW landfills emitting greater than or equal to 50 Mg/yr [55 tons per year (tpy)] of NMOCs. The standards require: (1) a well-designed and well-operated gas collection system, and (2) a control device capable of reducing NMOCs in the collected gas by 98 weight-percent. All affected facilities are required to periodically estimate their NMOC emissions rate in order to determine whether collection and control systems are required.[2]

LFG collection systems are either active or passive systems. Active collection systems provide a pressure gradient in order to extract LFG by use of mechanical blowers or compressors. Passive systems allow the natural pressure gradient created by the increased pressure within the landfill from LFG generation to mobilize the gas for collection.[2] The type of gas collection system adopted by a facility is largely dependent upon the landfill characteristics and operating practices. Gas extraction wells may be installed at the landfill perimeter, but are typically installed within the refuse of a landfill. Offsite migration probes are often installed at the landfill perimeter for monitoring the proper operation of the collection system. The depth and spacing of gas extraction wells vary with landfill characteristics and operations (i.e., lined or unlined, waste type, LFG generation, etc.).[2]

The effectiveness of a LFG collection system is also dependent upon its design and operation. Active gas collection systems are generally more efficient than passive gas collection systems.[2] A typical LFG collection system (i.e., typical LFG extraction well and well-field) is illustrated in Figure 2-3.[5]

LFG control and treatment options include (1) combustion of the LFG, and (2) purification of the LFG. Combustion technique options include those that destroy organics without energy recovery (i.e., flares), and those that recover energy from the destruction of organics (i.e., gas turbines, internal combustion engines, and boiler-to-steam turbine systems).[2] Purification technique options include the use of adsorption, absorption, and membranes to remove water (H_2O), CO_2, and NMOCs. Purification techniques can process raw LFG to pipeline quality natural gas by using adsorption, absorption, and membranes techniques.

Flares involve an open combustion process. Oxygen is usually provided by induction (enclosed flares) or simple mixing (candle flares) of ambient air. The LFG normally enters into a

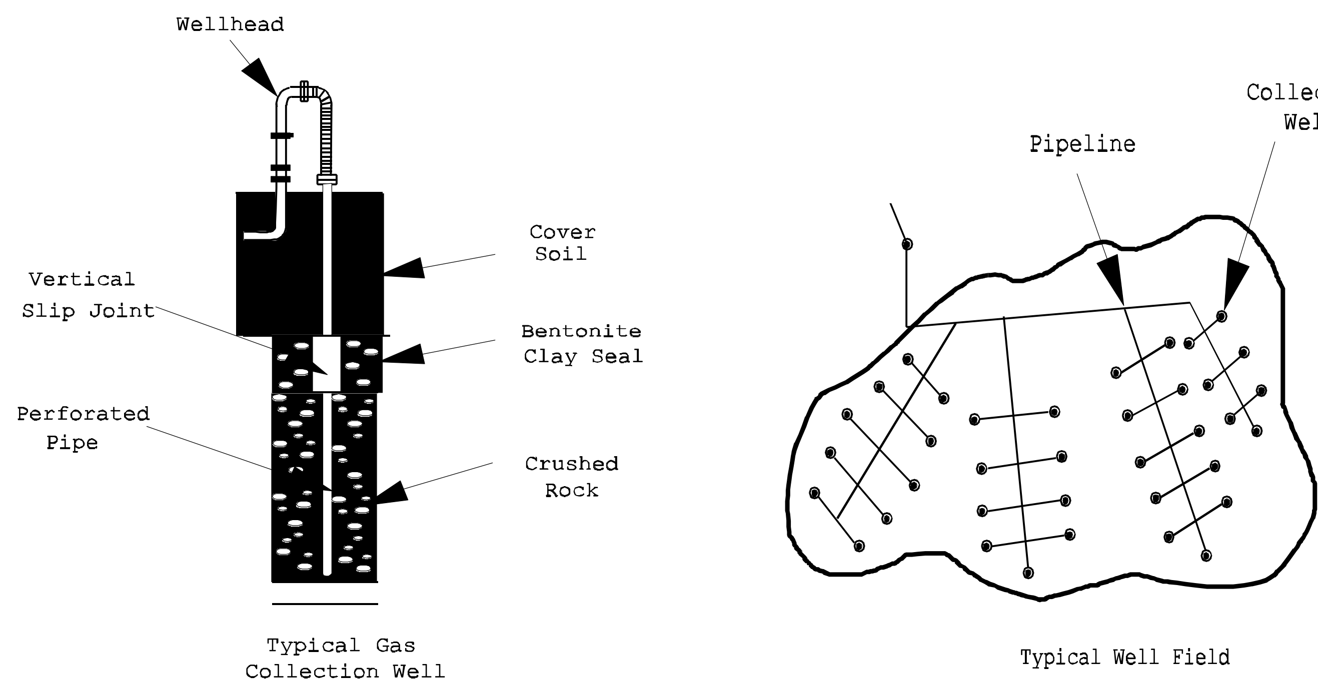


Figure 2-3. Typical LFG collection system.

Source: Reference 6.

flare collection header and transfer line via one or more blowers. At start-up a purge-gas may also be introduced into the header. The gas then proceeds to the knockout drum, which aids in the removal of condensate formed. The gas then proceeds through a flame barrier (i.e., water seal) prior to flares in order to prevent a flashback from the flares.[2] Flares can be open or enclosed. In an enclosed flare, the quality of combustion is governed by flame temperature, residence time of components in the combustion zone, turbulent mixing within the combustion zone, and the amount of oxygen available for combustion.[2] Figure 2-4 illustrates an example of an enclosed flare design.[2] A process diagram and description are submitted for an enclosed flare because of the prevalence of flare use as a LFG control technique at landfill facilities. Thermal incinerators are used to heat organic chemicals in the presence of sufficient oxygen to a temperature high enough to oxidize the chemical to CO_2 and water. Combustion techniques that recover energy include gas turbines and internal combustion engines that generate electricity from the combustion of LFG.[2] Figure 2-5 is a simplified schematic of a typical gas turbine.[2] Boilers can also be used to recover energy from LFG in the form of steam.[2]

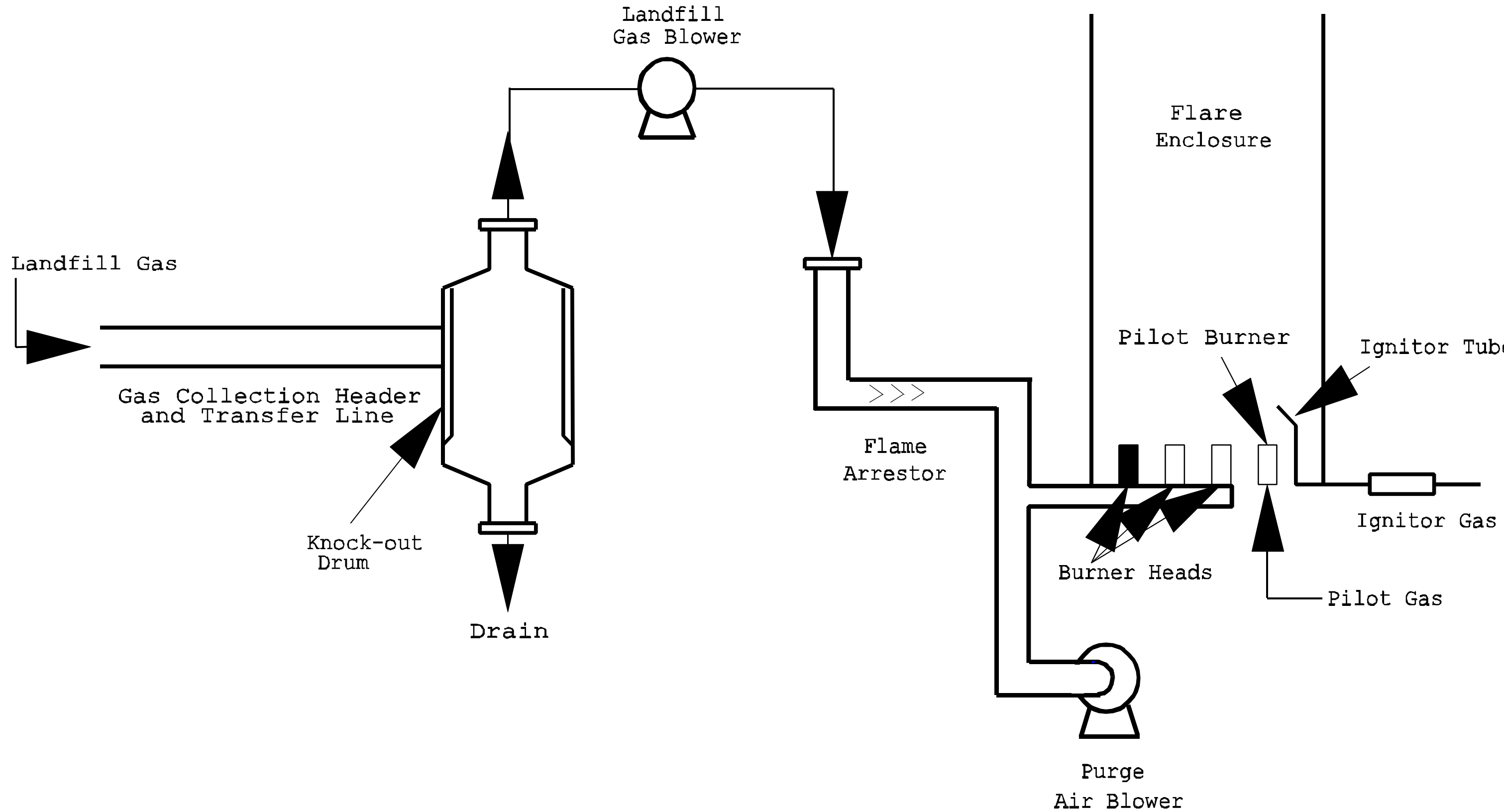


Figure 2-4. LFG pretreatment and enclosed flare.

Source: Reference 2.

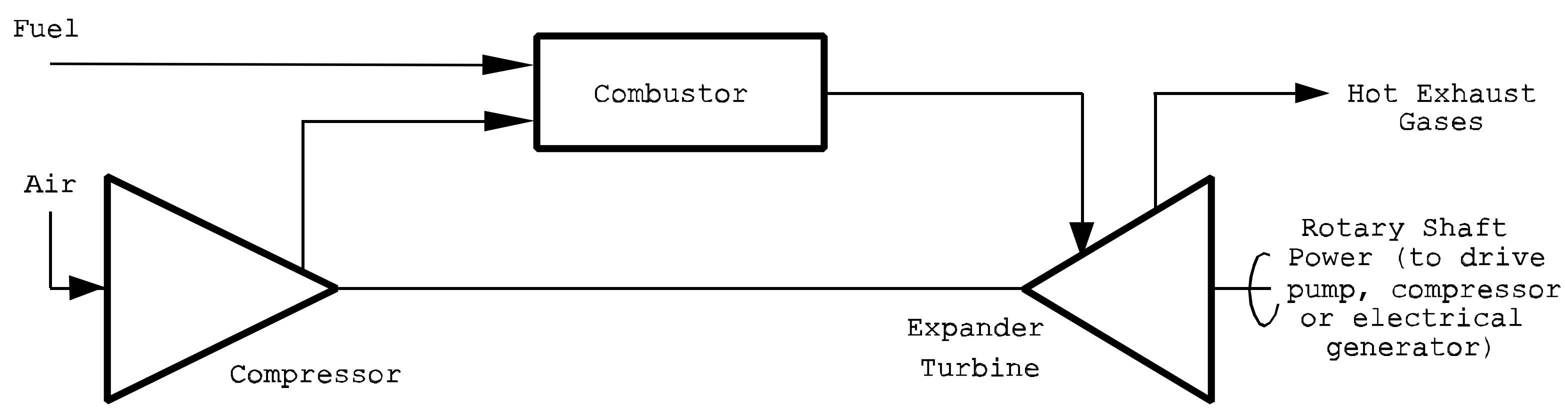


Figure 2-5. Simplified Schematic of Gas Turbine

Source: Reference 2

REFERENCES FOR CHAPTER 2.0

1. Federal Register. 40 CFR Part 258. Vol. 56, No. 196. October 9, 1991. pp. 50978.

2. U. S. Environmental Protection Agency. Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. March 1991. EPA-450/3-90-011a. Chapter 3 and 4.

3. U. S. Environmental Protection Agency. Characterization of Municipal Solid Waste in the United States: 1996 Update. May 1997. EPA/530-R-97-015.

4. State of California Air Resources Board. Suggested Control Measure for Landfill Gas Emissions. Stationary Source Division, Sacramento, California. August 1990. p. 21-22.

5. U. S. Environmental Protection Agency. Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources, Municipal Solid Waste Landfills. Federal Register, Vol. 56, No. 104. May 30, 1991. p. 24469, 24470.

6. Industrial Gas Turbine Systems for Landfill Gas to Energy Projects. Caterpillar Solar Turbines. W. L. Owen.

3.0 GENERAL DATA REVIEW AND ANALYSIS PROCEDURES

In the preparation stage for the MSW Landfill AP-42 section, a data gathering task was undertaken. This task included an extensive literature search, contacts to identify ongoing projects within EPA, and electronic database searches. Included in the data gathering was the collection of MSW landfills source test reports. After the data gathering was completed, a review of the information obtained was undertaken to reduce and synthesize the information. The following sections present the general data gathering and review procedures performed in the preparation of the MSW Landfill AP-42 section.

3.1 DATA GATHERING

3.1.1 Literature Search

The literature search conducted for the preparation of this AP-42 section included on-line library system searches of the Office of Research and Development/National Technical Information Service (ORD/NTIS) Database and the NSPS/CTG/CTC database. Information gathered during the preparation of the Proposed Standards and Guidelines (New Source Performance Standards) for MSW landfills was also accessed. This information was available through the EPA's Emission Standards Division, Research Triangle Park, North Carolina. Other information was accessed through the EPA's Air and Energy Engineering Research Laboratory's work on estimating global landfill emissions.

3.1.2 Contacts

Staff within the Emission Standards Division and Air and Energy Engineering Research Laboratory of the EPA with expertise in MSW landfills and testing were sought for their input and technical support, and to provide potential sources of information not already obtained. Telephone contact was also made with Michael Barboza, author of the AP-40 MSW LFG Emissions chapter.

3.1.3 Electronic Database Searches

The Crosswalk/Air Toxics Emission Factors (XATEF), VOC/PM Chemical Speciation (SPECIATE), and the Aerometric Information Retrieval System (AIRS)/Facility Subsystem Emission Factors (AFSEF) electronic databases were searched.

3.1.4 Data for the 1995 AP-42 Section Revision

Additional source test data were incorporated into the AP-42 section analysis from work conducted by EPA's Air and Energy Engineering Research Laboratory (AEERL) during the summer and fall of 1994.[1] Of the 41 source tests reviewed during the AEERL work, data from 18 of these tests were added to the AP-42 database. These 18 tests were selected using the AP-42 guidelines discussed in the following sections. During subsequent peer review, additional source test data were recieved. The quality of these data were reviewed and the new test data were incorporated as appropriate.

3.2 LITERATURE AND DATA REVIEW/ANALYSIS

Reduction of the literature and data into a smaller, more pertinent subset for development of the MSW Landfill AP-42 section was governed by the following:

- Only primary references of emissions data were used.
- Test report source processes were clearly identified.
- Test reports specified whether emissions were controlled or uncontrolled.
- Reports referenced for controlled emissions specify the control devices.
- Data support (i.e., calculation sheets, sampling and analysis description) was supplied in most cases. One exception is that some industry responses to the NSPS surveys were deemed satisfactory for inclusion.
- Test report units were convertible to selected reporting units.
- Test reports that were positively biased to a particular situation (i.e., test studies involving PCB analysis because of a known historical problem associated with PCB disposal in an MSW landfill) were excluded.

3.3 EMISSION DATA QUALITY RATING SYSTEM

As delineated by the Emission Inventory Branch (EIB), the reduced subset of emission data was ranked for quality. The ranking/rating of the data was used to identify questionable data. Each data set was ranked as follows:

A - When tests were performed by a sound methodology and reported in enough detail for adequate validation. These tests are not necessarily EPA reference method tests, although such reference methods were preferred.

B - When tests were performed by a generally sound methodology, but lack enough detail for adequate validation.

C - When tests were based on an untested or new methodology or are lacking a significant amount of background data.

D - When tests were based on a generally unacceptable method but the method may provide an order-of-magnitude value for the source.[2]

The selected rankings were based on the following criteria:

- Source operation. The manner in which the source was operated is well documented in the report. The source was operating within typical parameters during the test.

- Sampling procedures. If actual procedures deviated from standard methods, the deviations are well documented. Procedural alterations are often made in testing an uncommon type of source. When this occurs an evaluation is made of how such alternative procedures could influence the test results.

- Sampling and process data. Many variations can occur without warning during testing, sometimes without being noticed. Such variations can induce wide deviation in sampling results. If a large spread between test results cannot be explained by information contained in the test report, the data are suspect and are given a lower rating.

- Analysis and calculations. The test reports contain original raw data sheets. The nomenclature and equations used are compared with those specified by the EPA, to establish equivalency. The depth of review of the calculations is dictated by the reviewers' confidence in the ability and conscientiousness of the tester, which in turn is based on factors such as consistency of results and completeness of other areas of the test report.[2]

3.4 EMISSION FACTOR DETERMINATION AND RANKING

Once the data were ranked, the selection and determination of data for use in the development of emission factors for uncontrolled and controlled emissions was made. The emission factors developed and presented in the emission factor tables are ranked. The quality ranking ranges from A (best) to E (worst). As delineated by the EIB, the emission factor ratings are applied as follows:

A - Excellent. Developed only from A-rated source test data taken from many randomly chosen facilities in the industry population. The source category is specific enough to minimize variability within the source population.

B - Above average. Developed only from A-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with the A rating, the source is specific enough to minimize variability within the source population.

C - Average. Developed only from A- and B-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with the A rating, the source category is specific enough to minimize variability within the source population.

D - Below average. The emission factor was developed only from A- and B-rated test data from a small number of facilities, and there may be reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source population. Any limitations on the use of the emission factor are footnoted in the emission factor table.

E - Poor. The emission factor was developed from C- and or D-rated test data, and there may be reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Any limitations on the use of these factors are always clearly noted.[2]

Emission data quality and emission factor development and ranking according to the discussed methodology in this chapter are presented in more detail in Chapter 4.

REFERENCES FOR CHAPTER 3.0

1. Methodologies for Quantifying Pollution Prevention Benefits from Landfill Gas Control and Utilization, Roe, S.M., et al., EPA-600/R-95-089, U. S. Environmental Protection Agency, Research Triangle Park, North Carolina, July 1995.

2. Technical Procedures for Developing AP-42 Emission Factors and Preparing AP-42 Sections. Final, Emission Inventory Branch. Office of Air and Radiation. Office of Air Quality Planning and Standards. U. S. Environmental Protection Agency, Research Triangle Park, North Carolina, October, 1993.

4.0 DEVELOPMENT OF EMISSION ESTIMATION METHODS

The following chapter presents the test data reviewed and the methodology used to develop air pollutant emission factors, default values, and mass balance methods for MSW landfills.

4.1 DATA REVIEW

As discussed in Chapter 3.0, data were obtained during literature searches and submittals to EPA and reviewed to identify a reduced subset of emissions data. The reduced data subset was then reviewed and ranked for quality. The references reviewed are listed in the reference section of this chapter.[1-110]

A large number of the data references reviewed for use in deriving emission factors and default values are from compliance test reports submitted to the South Coast Air Quality Management District (SCAQMD) in California. While there may be an inherent data bias because of the disproportionate number of landfill test data being from California, varying controls, waste composition, operation and maintenance levels, and anaerobic states are expected from these compliance tests. Therefore, elimination of SCAQMD compliance data because of a location bias was not done because it was believed that the merit of these data references outweigh their bias. Generally, the compliance test reports are well documented source tests that follow SCAQMD test sampling method and analysis guidelines and are therefore comparable to data based on EPA methods. Other references reviewed were 114 survey responses requested by the U.S. EPA in the development of the New Source Performance Standard (NSPS) for landfills. Most of these survey responses were eliminated from the database due to their lack of supporting data. Those not eliminated had to provide sufficient detail on test methods to be judged adequate for use in emission factor development.

The remaining data references reviewed are research-based data and compliance data for areas outside of Southern California. Research data references were evaluated separately to determine whether an elimination of a data reference was necessary to eliminate an obvious bias. Bias found in some of the research references includes special study cases where optimum conditions may exist, or where a known, unrepresentative landfill waste composition may exist; these references were removed from the data set.

References were also excluded if source processes and/or control status were not clearly identified, or if the data were not convertible to selected reporting units. Illegible documents were also excluded. Table 4-1 presents data references excluded for the above reasons.

For the 1997 revision to the AP-42 Section 2.4, data from the review of an additional 58 source test reports were included. As mentioned in Chapter 3, 41 of these tests were gathered by AEERL.[53-93] An additional 17 test reports were submitted following a peer review of a 1995 draft of the AP-42 section and background report. Data from these reports were included as appropriate.[94-110]

Appendix A presents a summary of the test data used to derive MSW LFG emission factors. As mentioned previously, many of the California test reports were conducted by the SCAQMD as part of a program to monitor controlled emissions of vinyl chloride, toluene, benzene, and other selected compounds. Gas samples were generally collected using a series of evacuated 2-liter (0.5 gallon) gas bulbs. Gas samples were analyzed by gas chromatography and total combustion analysis at the District laboratory.

Once the subset of data were developed (by removing inappropriate data sources), the emissions data were ranked for quality. Quality ranking of the data, as discussed in Chapter 3.0, is presented in Table 4-2. All tests that were assigned as A rating were considered to have used sound testing methodologies with enough detail (i.e., background information) to validate the data. Tests that were assigned a B or C rating were qualified based on the reasoning for that rating. The only D-rated test

Table 4-1. REFERENCE DATA TESTS EXCLUDED

Reference Number*	Criteria for Exclusion
2	Questionable duplication of source tests.
3	Only controlled data used; uncontrolled data represent pretreated gas or gas from peripheral wells.
11	Samples considered invalid.
14	No process description or background information.
16	Sampling method unclear, illegible copy.
21	Pretreated gas.
25	Biased study - microbiological.
28	No data support.
29	Measurements for gas condensate only.
30	Biased - known to be a polychlorinated biphenyl (PCB) containing landfill.
31	Maximum concentrations only.
32	Biased - study after PCB remedial clean-up measures.
34	Composite of test data. Unable to validate.
38-39, 40,42,44	Questionnaire responses - reported modeled, duplicate SCAQMD, or poorly supported data.
71-73,75,76, 83-87,89-93,110	Missing process data - fuel feed rates, fuel composition.
74	No support data.
77	Mixed fuel use.
78-79	Duplicate test data.
80-81,88	Poorly supported data.
82	Test conducted during non-normal conditions.

* Reference numbers 33, 35-37, 45-47, and 52 are not reference tests.

Source: References 1 through 82.

data used to derive emission factors were from survey responses that presented information on specific compounds of interest that were not reported in any other references.

During the latest revision to this document and AP-42 Section, several sources of information were reviewed regarding the presence of mercury (Hg) in LFG.[94-97,103] The results of this analysis are presented in the following section.

4.2 RESULTS OF DATA ANALYSIS AND RECOMMENDED USAGE FOR UNCONTROLLED EMISSIONS

Once the data subset was ranked, the data were evaluated for derivation of emission factors and default values. The following sections present equations for estimating emissions from landfills, suggested inputs to the equations (i.e., default values), and the derivation of emission factors for MSW landfills.

4.2.1 Estimation Methods for Uncontrolled Emissions

To estimate uncontrolled emissions of the various compounds present in LFG, total LFG emissions must first be estimated. Emissions for the LFG depend on several factors including: (1) the size, configuration, and operating conditions of the landfill; and (2) the characteristics of the refuse such as moisture content, age, and composition. Uncontrolled CH_4 emissions may be estimated for individual landfills by using a theoretical first-order kinetic model of methane production. This method of estimating emissions could result in conservative (i.e., high) estimates of emissions, since it provides estimates of LFG generation and not LFG release to the atmosphere. Some capture and subsequent microbial degradation of organic LFG constituents within the landfill's surface layer is likely to occur, however no data were identified to adequately quantify this process. For the purposes of emission estimation, biodegradation of LFG constituents is assumed to be negligible.

Table 4-2. RANKING OF REFERENCE DATA TESTS

Reference Number	Ranking (A-D)
1	A
3	A - for controlled gas only.
4-6	A
7	C - no process description.
8-12	A
13	B - calculation sheet illegible.
15	A
17-20	A
22-24	A
26-27	A
41	A
43	D - survey response; calculations not included.
48-51	A
53	B - lacking some process data and calculations.
54-55	A
56	C - lacking field data and calculations.
57	B - lacking some process data and calculations.
58	C - lacking field data and calculations.
59-64	A
65	C - calculations not included.
66-69	A
70	C - lacking field data and calculations.
94	C - lacking field data.
95	C - lacking field data.
96	A
97	A
98	A
99	B - lacking calculations.
100	D - summary tables only.
101	D - summary tables only.
102	D - summary tables only.
103	A
104	A
105	A
106	C - variability in test results
107	A
108	A
109	A

Note: A-rated data were considered to be the best data and are not qualified. B through C-rated data are qualified to identify shortcomings of the data. D-rated data were excluded prior to data ranking. References 34 through 37, 45 through 47, and 52 are background information documents.
Source: References 1 through 110.

A computer program that uses the theoretical model mentioned above is known as the Landfill Air Emissions Estimation Model (hereafter referred to as "the landfill model"), and can be accessed from the Office of Air Quality Planning and Standards Technology Transfer Network Website (OAQPS TTN Web) in the Clearinghouse for Inventories and Emission Factors (CHIEF) technical area (URL http://www.epa.gov/ttn/chief). The landfill model equation is as follows:[45]

$$Q_{CH_4} = L_o \, R \, (e^{-kc} - e^{-kt}) \tag{1}$$

where:

Q_{CH_4} = Methane generation rate at time t, m^3/yr;

L_o = Methane generation potential, m^3 CH_4/Mg refuse;

R = Average annual refuse acceptance rate during active life, Mg/yr;

e = Base log, unitless;

k = Methane generation rate constant, yr^{-1};

c = Time since landfill closure, yrs (c=0 for active landfills); and

t = Time since the initial refuse placement, yrs.

Emissions can be converted to English units by multiplying Q_{CH_4} by 35.31 to obtain ft^3/yr, L_o by 32.0 to obtain ft^3 CH_4/ton, and R by 1.1 to obtain tpy.

Site-specific landfill information is generally available for variables R, c, and t. When refuse acceptance rate information is scant or unknown, R can be estimated by dividing the refuse in place by the age of the landfill.[45] If a facility has documentation that a certain segment (cell) of a landfill has received only nondegradable refuse, then the waste from this segment of the landfill can be excluded from the calculation of R. Nondegradable refuse includes, but is not limited to, concrete, brick, stone, glass, plaster, wallboard, piping, plastics, and metal objects. The average annual acceptance rate should only be estimated by this method when there is inadequate information available on the actual annual acceptance rate. [NOTE: Greater precision in emission rates can be achieved with the use of site-specific data and EPA's the landfill model, since the model can compute methane generation based on the age of each landfill segment.]

Values for the variables L_o and k must be estimated.
The potential CH_4 generation capacity of refuse (L_o) is dependent on the organic (primarily cellulose) content of the refuse and can vary widely [6.2 to 270 m^3 CH_4/Mg refuse (200 to 8670 ft^3/ton)].[45] The value of the CH_4 generation constant (k) is dependent on moisture, pH, temperature, and other environmental factors, as well as landfill operating conditions.[45] Site-specific LFG generation constants can be determined with EPA Reference Method 2E.[45]

The landfill model includes both regulatory default values and recommended AP-42 default values for L_o and k (see below). The regulatory defaults were developed for regulatory compliance purposes (NSPS and Emission Guideline) and to provide conservative default values on a national basis for the proposed regulation. As a result, the regulatory L_o and k default values may not be representative of specific landfills, and may not be appropriate for use in an emissions inventory. Therefore, different L_o and k values may be appropriate in estimating emissions for particular landfills.

The use of site-specific data rather than either set of landfill model defaults is preferred. To do this, the landfill operator would need to select an appropriate value of L_o from the literature and then use EPA Method 2E to determine k.

Recommended AP-42 defaults include a k value of 0.04/yr for areas recieving more than 25 inches of rainfall per year, and 0.02/yr for dry areas (<25 inches of rainfall per year). These recommendations are based on a comparison of gas-yield forecasts with LFG recovery data.

A default L_o value of 100 m^3/Mg (3,530 ft^3/ton) refuse is recommended for emission inventory purposes.[46] This value is recommended because it provided better agreement of emissions derived from empirical (measured) data to predicted emissions when k was set to 0.04. The results of this comparison are depicted in Table 4-3. It must be emphasized that in order to comply with the NSPS and

Emission Guideline, the regulatory defaults for k and L_o must be applied as specified in the final rule.

When gas generation reaches steady-state conditions, sampled LFG consists of approximately 40 percent CO_2; 55 percent CH_4; up to 5 percent nitrogen (and other atmospheric gases due to infiltration from the LFG collection system or sample dilution); and only trace amounts of NMOC (typically, less than 2 percent). Therefore, the estimate derived for CH_4 generation using the landfill model can also be used to estimate CO_2 generation (i.e., $CO_2 = 40/55 \times CH_4$).[45] The sum of the CH_4, nitrogen, and CO_2 emissions will yield an estimate of total LFG emissions.

Emissions of NMOCs result from their volatilization in the landfilled waste, and by their creation from biological processes and chemical reactions within the landfill.[45] Test reports gathered during the literature retrieval process provided concentrations of total NMOCs and speciated NMOCs in LFG.

If site-specific data are to be used to develop emission estimates, the concentrations for total NMOC and speciated NMOCs should be corrected for air infiltration. Air infiltration can occur via two different mechanisms: LFG sample dilution and air intrusion into the landfill (i.e., air pulled in from overdraw of the LFG collection system). LFG constituent concentrations should be corrected for sample dilution as described below if the ratio of N_2 to O_2 is less than or equal to 4.0 (i.e., the ratio in ambient air is 3.76). If the ratio is greater than 4.0, then the LFG constituent concentrations should be corrected for air intrusion (also described below).

For the purposes of developing default LFG constituent concentrations, it was assumed that air intrusion was minimal and the data were corrected for sample dilution only. This

Table 4-3.

COMPARISON OF MODELED AND EMPIRICAL LFG GENERATION DATA[a]

Landfill[b]	Predicted CH_4 (10^6 m^3/yr)	Predicted/ Empirical CH_4	Landfill[b]	Predicted CH_4 (10^6 m^3/yr)	Predicted/ Empirical CH_4
a	37.6	0.68	u	4.62	0.63
b	39.9	0.77	v	10.5	1.44
c	31.8	0.73	w	4.28	0.72
d	49.8	1.51	x	5.62	0.96
e	12.1	0.53	y	2.39	0.44
f	17.3	0.82	z	9.59	1.84
g	23.6	1.28	aa	5.08	1.08
h	8.61	0.49	bb	4.93	1.15
i	14.9	0.93	cc	3.93	0.93
j	14.5	0.94	dd	2.74	1.03
k	14.2	0.96	ee	8.37	3.23
l	7.16	0.50	ff	117	0.83
m	18.0	1.31	gg	14.4	0.58
n	8.57	0.76	hh	23.0	1.44
o	4.56	0.48	ii	29.6	2.19
p	17.4	1.87	jj	19.3	1.47
q	10.2	1.21	kk	22.4	1.71
r	6.95	0.87	ll	41.3	4.00
s	2.29	0.29	mm	7.14	0.81
t	3.49	0.45	nn	1.07	0.29
	Average			1.10	
	Maximum			3.23	
	Minimum			0.29	
	Standard Dev.			0.73	

[a] k = 0.04

[b] Landfill names are considered to be confidential.

assumption may have biased the default concentrations slightly high in cases where air intrusion to the landfill was significant. The correction for sample dilution was done by assuming that CO_2 and CH_4 were the primary (approximately 100 percent) constituents of the LFG and using the following equation:

$$C_{P_{cor}} = \frac{C_P \ (1 \times 10^6)}{C_{CO_2} + C_{CH_4}} \qquad (2)$$

where:

$C_{P_{cor}}$ =	Sample dilution corrected concentration of the pollutant of interest, P, in LFG, ppmv;
C_P =	Concentration of the pollutant of interest, P, in LFG, (i.e., NMOC as hexane) ppmv;
C_{CO_2} =	CO_2 concentration in LFG, ppmv;
C_{CH_4} =	CH_4 concentration in LFG, ppmv; and
$1x10^6$ =	Constant used to maintain pollutant concentration units in ppmv.

In order to correct the constituent concentrations for air intrusion into the landfill, the concentration of N_2 (i.e., C_{N_2}) needs to be added to the denominator of equation 2. Values for C_{CO_2} and C_{CH_4} were available for most landfills.

The Landfill Air Emissions Estimation model contains a regulatory default value for total NMOC expressed as hexane.
However, there is a wide range for total NMOC values from landfills as will be shown in the following section. The regulatory default value for NMOC concentration was developed for regulatory compliance purposes and to provide for a conservative default value on a national basis. For emission inventory purposes, it is always preferable that site-specific information be taken into account when determining the total NMOC concentration (i.e., NMOC, CO_2, N_2 and CH_4

sampling and analysis). The derivation of AP-42 default concentrations is described in the following sections.

4.2.2 Derivation of AP-42 Default Concentrations

Test reports containing speciated NMOC data were reviewed to determine uncontrolled emission concentrations for specific NMOCs. Appendix B presents the speciated test data. As shown in Appendix B, the data also reflect the co-disposal history of the landfill to the extent known. Landfills known to have accepted non-residential wastes and those known to have never accepted non-residential wastes are delineated. For most landfills, the disposal history is unknown. The speciated NMOC concentrations were then adjusted for air infiltration, as described above, based on sample-specific values for C_{CO_2} and C_{CH_4} at each landfill.

Summary statistics are also given in Table 4-5 for each compound. These statistics are derived from the average concentrations for each landfill (i.e., a data point is a site average often based on many test results). For each compound, a normality test was performed. A probability (p value) for the normality test statistic of ≤ 0.05 indicates that the data are likely not to be normally distributed. For many compounds, the data were found not to be normally distributed. For those compounds where data were normally distributed, the mean was selected as the best estimator of central tendency (default concentration).

For those compounds that were not normally distributed, another statistical assessment was performed to determine if the data were log normally distributed. Data on the concentrations of the following nine compounds were shown to approximate log normal distributions: 1,2-dichloropropane, acrylonitrile, benzene (at co-disposal sites), chlorodifluoromethane, chloroethane, chloroform, dichlorofluoromethane, methyl isobutyl ketone, and methyl mercaptan. For these LFG constituents, the geometric mean was selected as the default concentration. For the remaining constituents with non-normally distributed data, the median of the normal distribution was selected as the default concentration.

Several sources of data on the mercury (Hg) content of LFG were reviewed in order to develop a default concentration for use in AP-42.[94-97,103] The tests that are documented in these sources were performed using a variety of test methods (i.e., sample collection using gold amalgam traps or potassium permanganate solution). In addition, the level of detail in process description was often lacking (i.e., level of gas processing prior to the point of sample collection). In addition, full test reports were often not available. Due to these limitations, the default concentration presented below should be used with caution.

The available Hg data represent information from 14 landfills, however nine of these were represented by a single average concentration. For all 14 landfills, total Hg concentrations in raw LFG (no data were available for making air infiltration corrections) ranged from 1.27×10^{-5} to 1.49×10^{-3} ppmv. The high end of the range is based on data from one landfill. Most of the data showed total Hg concentrations to be in the 10^{-4} to 10^{-5} ppmv range (no speciation data were available for elemental versus organic forms of Hg). The nature of the available data precluded an assessment of default concentration as described above. The arithmetic mean total Hg concentration of all 14 sites was selected as the default (2.53×10^{-4} ppmv). Although the data are positively skewed by one high test result, this same test is the highest quality data within the data set (i.e., most current and with the best documentation). Therefore, it was not considered to be an outlier (in which case, the median would have been selected as the default).

The ratings assigned to defaults in Tables 4-5 and 4-6 were derived using the criteria below. Additional downward adjustments of one letter were made to defaults where the data was highly variable (i.e., standard deviation greater than twice the default concentration) or based on data that may not be representative of the entire population.

Data Rating	# of Data Points
A	>20
B	10 - 19
C	6 - 9
D	3 - 5
E	<3

4.2.3 Assessment of Default Concentrations for Selected Constituents by Co-Disposal History

An analysis was performed for selected compounds to determine if the default LFG constituent concentrations differed significantly between landfills based on their co-disposal history with non-residential wastes. LFG constituents were selected for analysis based on their potential to be associated with co-disposal of non-residential wastes and the availability of sufficient data. These compounds are presented in Table 4-4. Default concentrations for the remaining LFG constituents are presented in Table 4-5.

Because the majority of the data available for each of the eight constituents selected for analysis are coded as unknown ("U") for their co-disposal history, unequal sample sizes for statistical tests result. Furthermore, tests for normality showed that the concentration data for all of these compounds were not normally distributed. Therefore, nonparametric statistical tests were applied to the data.

The Kruskal-Wallis K-Sample Test was employed to compare the differences between the multiple mean rank scores (K=3) for the eight constituents shown in Table 4-4 for which there were sufficient data for analysis. Table 4-4 shows that, of the eight constituents tested, only the benzene data suggest significant differences in the mean rank scores (i.e., $p \leq 0.05$). However, along with the Kruskal-Wallis K-Sample Test, the Tukey Multiple Comparisons Test was performed. This technique can be used to

Table 4-4. RESULTS OF NON-PARAMETRIC ANALYSIS

Compound	Co-disposal?	Sample size (N)	P-Value of K-Sample Test Statistic	Two-Sample Test	P-Value of Two-Sample Test Statistic
Benzene	Y	6		Y vs. N	0.144
	N	5	0.042	Y vs. U	0.016
	U	41		N vs. U	0.458
				Y vs. UN	0.016
NMOC	Y	5		Y vs. N	0.121
	N	6	0.1374	Y vs. U	0.082
	U	12		N vs. U	0.606
				Y vs. UN	0.057
Toluene	Y	5		Y vs. N	0.171
	N	6	0.1882	Y vs. U	0.081
	U	45		N vs. U	0.736
				Y vs. UN	0.075
Vinyl chloride	Y	6			
	N	5	0.167	---	---
	U	42			
Trichloroethylene	Y	6			
	N	5	0.2685	---	---
	U	46			
Tetrachloroethene	Y	6			
	N	8	0.436	---	---
	U	45			
1,1,1-Trichloroethane	Y	6			
	N	5	0.8781	---	---
	U	31			
Carbon tetrachloride	Y	4			
	N	5	0.9185	---	---
	U	13			

U = Co-disposal history unknown.
Y = Known to have co-disposal of non-residential wastes.
N = Known to have no co-disposal of non-residential wastes.

Table 4-5. DEFAULT CONCENTRATIONS FOR LFG CONSTITUENTS
References 1-110

Compound	Molecular Weight	Default Concentration (ppmv)	Data Points[a]	Rating
1,1,1-Trichloroethane (methyl chloroform)[b]	133.42	0.48	42	B
1,1,2,2-Tetrachloroethane[b]	167.85	1.11	8	C
1,1-Dichloroethane (ethylidene dichloride)[b]	98.95	2.35	31	B
1,1-Dichloroethene (vinylidene chloride)[b]	96.94	0.20	21	B
1,2-Dichloroethane (ethylene dichloride)[b]	98.96	0.41	27	B
1,2-Dichloropropane (propylene dichloride)[b]	112.98	0.18	8	D
2-Propanol (isopropyl alcohol)	60.11	50.1	2	E
Acetone	58.08	7.01	19	B
Acrylonitrile[b]	53.06	6.33	4	D
Bromodichloromethane	163.83	3.13	7	C
Butane	58.12	5.03	15	C
Carbon disulfide[b]	76.13	0.58	8	C
Carbon monoxide[c]	28.01	141	2	E
Carbon tetrachloride[b]	153.84	0.004	22	B
Carbonyl sulfide[b]	60.07	0.49	6	D
Chlorobenzene[b]	112.56	0.25	14	C
Chlorodifluoromethane	86.47	1.30	13	C
Chloroethane (ethyl chloride)[b]	64.52	1.25	25	B
Chloroform[b]	119.39	0.03	22	B
Chloromethane	50.49	1.21	21	B
Dichlorobenzene[d]	147	0.21	2	E
Dichlorodifluoromethane	120.91	15.7	25	A
Dichlorofluoromethane	102.92	2.62	5	D
Dichloromethane (methylene chloride)[b]	84.94	14.3	37	A
Dimethyl sulfide (methyl sulfide)	62.13	7.82	10	C
Ethane	30.07	889	9	C
Ethanol	46.08	27.2	2	E
Ethyl mercaptan (ethanethiol)	62.13	2.28	3	D
Ethylbenzene[b]	106.16	4.61	39	B
Ethylene dibromide	187.88	0.001	2	E

Table 4-5. DEFAULT CONCENTRATIONS FOR LFG CONSTITUENTS
References 1-110

Compound	Molecular Weight	Default Concentration (ppmv)	Data Points[a]	Rating
Fluorotrichloromethane	137.38	0.76	27	B
Hexane[b]	86.18	6.57	19	B
Hydrogen sulfide	34.08	35.5	15	B
Mercury (total)[b,e]	200.61	2.53×10^{-4}	14	E
Methyl ethyl ketone[b]	72.11	7.09	22	A
Methyl isobutyl ketone[b]	100.16	1.87	15	B
Methyl mercaptan	48.11	2.49	8	C
Pentane	72.15	3.29	17	C
Perchloroethylene (tetrachloroethylene)[b]	165.83	3.73	59	B
Propane	44.09	11.1	21	B
t-1,2-dichloroethene	96.94	2.84	36	B
Trichloroethylene (trichloroethene)[a]	131.38	2.82	57	B
Vinyl chloride[b]	62.50	7.34	53	B
Xylenes[b]	106.16	12.1	40	B

NOTE: This is not an all-inclusive listing of LFG constituents. It is only a listing of constituents for which data were available at multiple sites.
[a] A data point is a single site average which may have been composited from many more source test results (see Appendix B).
[b] Hazardous Air Pollutants listed in Title III of the 1990 Clean Air Act Amendments.
[c] Carbon monoxide is not a typical constituent of LFG, but does exist in instances involving landfill (underground) combustion. Therefore, this default value should be used with caution. Of 18 sites where CO was measured, only 2 showed detectable levels of CO in LFG.[1-51]
[d] Source tests did not indicate whether this compound was the para- or ortho- isomer. The para-isomer is a Title III-listed HAP.
[e] No data were available to speciate total Hg into the elemental versus organic forms.

simultaneously compare the means of each pair of groups (i.e., Y and N, N and U).

The results of the Tukey Multiple Comparisons Test suggest that significant differences exist between the means of "Y" sites and the means of "U" or "N" sites for benzene, toluene, and NMOC. The Wilcoxon-Mann-Whitney Two Sample Test was then applied to the paired combinations of "Y", "N", "U", and "UN" (combined data from unknown and no co-disposal sites) for benzene, toluene, and NMOC. As shown in Table 4-4, the results of this test showed that there were significant differences (at the <0.10 level of significance) between "Y" and "U" sites, but not between "Y" and

Table 4-6. UNCONTROLLED CONCENTRATIONS OF BENZENE, NMOC, AND TOLUENE BASED ON WASTE DISPOSAL HISTORY

References 1-110

Compound	Molecular Weight	Default Concentration (ppmv)	No. Of Data Points	Emission Factor Rating
Benzene[a]	78.11			
Co-disposal		11.1	6	D
No or Unknown Co-disposal		1.91	46	B
NMOC (as hexane)[b]	86.18			
Co-disposal		2420	5	D
No or Unknown Co-disposal		595	18	B
Toluene[a]	92.13			
Co-disposal		165	5	D
No or Unknown Co-disposal		39.3	51	A

[a] Hazardous Air Pollutants listed in Title III of the 1990 Clean Air Act Amendments.
[b] For NSPS/EG compliance purposes, the default concentration for NMOC as specified in the final rule must be used. For purposes not associated with NSPS/EG compliance, the default VOC content at co-disposal sites = 85% by weight (2060 ppmv as hexane); at No or Unknown sites = 39% by weight (235 ppmv as hexane).

"N" sites. For toluene and NMOC, the "Y" versus "UN" pairing produced even higher statistical differences.

Although these results are based on a limited database, they lead to the following conclusions:

- No significant differences have been identified in concentrations in LFG of the following compounds regardless of their co-disposal history: trichloroethylene, vinyl chloride, 1,1,1,-trichloroethane, carbon tetrachloride, and tetrachloroethene (perchloroethylene).

- Benzene, toluene, and NMOC concentrations are significantly different among landfills where (A) it is known that non-residential wastes were accepted in the past, and (B) it is unknown whether or not non-residential wastes were accepted in the past and where it is known that these wastes were not accepted.
- Two unique concentrations can be developed for benzene, toluene, and NMOC corresponding to the co-disposal history of the landfill (i.e., one for co-disposal and one for unknown and no co-disposal sites).

Default concentrations for benzene, toluene, and NMOC based on the landfill's co-disposal history are presented in Table 4-6.

As discussed in Chapter 3.0, the default concentrations were rated based on the test series used for their derivation. It should be emphasized that a large number of LFG test reports were from California, and a number of site-specific variables could not be accounted for (i.e., waste composition, landfill size, climatic conditions, etc.).

Another source of uncertainty is the overall representativeness of the samples in terms of their characterization of LFG that would be emitted from an uncontrolled landfill. Most of the samples were taken from LFG collection equipment in such a way as to characterize the inlet stream to a control device (i.e., flare inlet concentrations for determination of destruction efficiency). This location for sample collection may not be representative of the raw landfill gas, since some condensation and compression has often taken place (e.g., water knock-out drums). LFG constituents are often captured to some degree in the LFG condensate which may be treated on-site, reinjected to the landfill, or sent off-site for treatment. LFG constituents for which this issue if of greatest concern are those with higher molecular weights and water solubilities. For the purposes of emission estimation, it is assumed that these losses to condensate are small and that subsequent revolatilization of these constituents (either on- or off-site) will negate any significant overstatement of emissions.

EPA received additional summary data on Tier 2 NSPS/EG NMOC testing at eleven sites outside of California too late for inclusion in this version of the AP-42 section.[111] These data are taken directly from the landfill subsurface and appear to have come from either no or unknown co-disposal sites. The average NMOC as hexane concentration of 557 ppmv agrees well with the default value of 595 ppmv presented in Table 4-6.

4.2.4 Estimation of Uncontrolled Compound-Specific Emissions

Compound-specific emissions can be estimated from the default concentrations presented in Tables 4-5 and 4-6 and the estimated total amount of LFG generated. As mentioned previously, the Landfill model can be used to estimate methane emissions, assuming that the LFG production has reached steady-state conditions. Data from 12 landfills in seven states were used to derive a default LFG concentration of 55 percent CH_4 and 45 percent CO_2 and other constituents (after adjusting for sample dilution). Based on this assumed composition, emissions of specific LFG constituents can be estimated with the use of the following equation:

$$Q_P = 1.82\ Q_{CH_4} * \frac{C_P}{(1 \times 10^6)} \qquad (3)$$

where:

Q_P	=	Emission rate of pollutant P (i.e., NMOC as hexane), m^3/yr;
Q_{CH_4}	=	CH_4 generation rate, m^3/yr (from the Landfill model);
C_P	=	Concentration of P in landfill gas, ppmv; and
1.82	=	Multiplication factor (assumes that approximately 55 percent of landfill gas is CH_4 and 45 percent is CO_2 and other constituents).

Emissions can be converted to English units by multiplying both Q_P and Q_{CH_4} by 35.31 to obtain ft^3/yr. Uncontrolled mass emissions per year of total NMOC (as hexane), CO_2, CH_4, and speciated organic and inorganic compounds can be estimated by the following equation:

$$UM_P = Q_P * \left[\frac{MW_P * P}{R\ T\ (1000g/kg)}\right] \quad (4)$$

where:

UM_P	=	Uncontrolled (total) mass emissions of the pollutant of interest (i.e., NMOC as hexane)(kg/yr);
P	=	Ambient pressure, 1 atm assumed;
Q_P	=	Pollutant emission rate, m^3/yr;
R	=	Ideal gas constant, 8.205 x 10^{-5} m^3-atm/gmol-°K;
T	=	Temperature of LFG, °K (i.e., 273 + °C); and
MW_P	=	Molecular weight of P (i.e., 86.18 for NMOC as hexane), g/gmol;

For this equation, it is assumed that the operating pressure of the system is approximately 1 atmosphere. If the temperature of the LFG is not known, a temperature of 25°C (77°F) is recommended. Emissions can be converted to English units by multiplying UM_P by 1.102 x 10^{-3} to obtain tpy.

A default weight fraction for volatile organic compounds (VOC) was derived for both No/Unknown co-disposal sites and co-disposal sites. This was done by assuming that a typical landfill generates gas with a composition consistent with the default concentrations in Tables 4-5 and 4-6 (i.e., NMOC at a co-disposal site is present at 2,420 ppmv versus 595 ppmv at No/Unknown sites). In a specific volume of LFG for each type of site, the mass of negligibly reactive compounds was subtracted from the mass of NMOC in order to derive the VOC content. For No/Unknown co-disposal sites, the default VOC content is 39 percent by weight or 235 ppmv as hexane. For co-disposal sites, the default VOC content is 85 percent by weight or 2,060 ppmv as hexane. Extreme caution should be used in the use of these default VOC contents, since they are driven in large part by the default value assumed for ethane (especially the no/unknown co-disposal value). The ethane default concentration (889 ppmv) is based on data from only nine landfills and is the mean value of a distribution with a range of 21.9 to 1,802 ppmv (see Appendix B).

4.3 RESULTS OF DATA ANALYSIS AND RECOMMENDED USAGE FOR CONTROLLED EMISSIONS

Emissions from landfills are typically controlled by installing a gas collection system. The collected gas is combusted through the use of internal combustion engines, flares, turbines, or boilers. Because gas collection systems are not 100 percent efficient in collecting LFG, emissions of uncollected CH_4, CO_2, and NMOCs must be estimated. Control (destruction) efficiencies can be used to estimate emissions of non-combusted NMOCs from the control devices. Also, emission factors can be used to estimate emissions of secondary pollutants from control devices.

Background data used to derive default control efficiencies and secondary pollutant emission factors are presented in Appendix C. Similar methods for determination of the best estimate of central tendency to those described above for default concentrations were used for these defaults. In general, when more than three data points were available, the default was selected among the arithmetic mean, the median, and the geometric mean. If fewer than four data points were available, either the arithmetic mean or the median was selected as the default.

A data point can be an average value from a single device or a composite of these averages among multiple similar devices. Data points were composited in this way when devices were known to be identical (i.e., same manufacturer and model number), located at the same site, and fired on the same LFG (i.e., devices were not fired on gas collected from differing sections of the landfill). The only exception to this was for flares. For flares, it was assumed that equipment operation and maintenance was similar among devices and that any differences in LFG composition at a given site were negligible. Given these assumptions, variability in emission rates due to differences in equipment construction at a given site were assumed to be negligible. Another reason for compositing some of the data from devices at the same site was to remove bias that would have resulted due to the preponderance of data received from certain sites.

To estimate controlled emissions of CH_4, NMOCs, and other constituents in LFG, the collection efficiency of the system must first be estimated. Several factors in the design and operation are influential in determining the collection efficiency.

These factors include (1) gas moving equipment capable of handling the LFG at its maximum generation rate; and (2) collection wells and trenches configured so the gas is effectively collected from all areas of the landfill.[45] Reported gas collection efficiencies typically range from 60 to 85 percent, with an average of 75 percent most commonly assumed.[52] Higher efficiencies may be achieved at some sites (i.e., at lined landfills with well-designed collection systems). If a site-specific collection efficiency is available (i.e., derived from a surface sampling program), it should be used instead of the 75 percent average.

Controlled emission estimates also need to take into account the control efficiency of the control device. Control efficiencies for the combustion of NMOC, halogenated (i.e., chlorinated), and nonhalogenated organics with differing control devices are presented in Table 4-7. A CH_4 control efficiency of 99.9% can be assumed for any well operated and maintained LFG combustion equipment in lieu of a guarantee from an equipment vendor.[112] Emissions from the control devices need to be added to the uncollected emissions to estimate total controlled emissions.

4.3.1 <u>Controlled CH_4, NMOC, and Speciated Organic Emissions</u>

Controlled CH_4, NMOC, and speciated organic emissions can be calculated with equation 5. It is assumed that the LFG collection and control system operates 100 percent of the time. Minor durations of system downtime associated with routine maintenance and repair (i.e., 5 to 7 percent) will not appreciably effect emission estimates.[112] Also, control and utilization equipment are often served by back-up flares which limit uncontrolled emissions when the primary combustion device is under repair. The first term in equation 5 accounts for emissions from uncollected LFG, while the second term accounts for emissions of the pollutant that were collected but not combusted in the control or utilization device:

$$CM_P = \left[UM_P * \left(1 - \frac{\eta_{col}}{100} \right) \right] + \left[UM_P * \frac{\eta_{col}}{100} * \left(1 - \frac{\eta_{cnt}}{100} \right) \right] \qquad (5)$$

where:

CM_P = Controlled mass emissions of the pollutant of interest, P, kg/yr;

UM_P = Uncontrolled mass emissions of P, kg/yr (from equation 4 or the Landfill model);

η_{col} = Collection efficiency of the LFG collection system, percent; and

η_{cnt} = Control efficiency of the LFG control or utilization device, percent.

Emissions can be converted to English units by multiplying both CM_P and UM_P by 1.102×10^{-3} to obtain tpy. The efficiencies of the control devices are presented in Table 4-7. Control efficiencies were calculated using the following equation:

$$\eta_{cnt} = \frac{In - Out}{In} * 100 \qquad (6)$$

where:

In = Mass rate of compound entering control device; and

Out = Mass rate of compound exiting the control device.

The inlet mass rates are calculated the same way as the controlled or outlet mass emission rates described below.

The emission rate of each compound from the control device was calculated using the following equation:

$$M = \frac{C_c * MW * Q * 60 * 10^{-6}}{22.39} \qquad (7)$$

where:

M = mass emission rate, kg/hr;

Q = Volumetric flow rate of exhaust, in dscm/min;

C_c = Concentration of compound C, in ppmv;

60 = Conversion factor, min/hr;

10^{-6} = Conversion factor (ppmv to volume fraction), $ppmv^{-1}$;

22.39 = Standard gas volume, dscm/kgmol.

Table 4-7. CONTROL EFFICIENCIES FOR LFG CONSTITUENTS

Control Device (SCC)	Constituent[a]	Control Efficiency[b] (%) Typical	Range	Data Points[c]	Rating
Boiler/Steam Turbine (50100306) (50100406)	NMOC	98.0	96-99+	3	D
	Halogenated species	99.6	87-99+	4	D
	Non-Halogenated species	99.8	67-99+	4	D
Flare[d] (50100303) (50100403)	NMOC	99.2	90-99+	14	B
	Halogenated species	99.2	91-99+	8	C
	Non-Halogenated species	99.7	38-99+	8	C
Gas Turbine (50100305) (50100405)	NMOC	94.4	90-99+	2	E
	Halogenated species	99.7	98-99+	2	E
	Non-Halogenated species	98.2	97-99+	2	E
IC Engine (50100304) (50100404)	NMOC	97.2	94-99+	3	E
	Halogenated species	93.0	90-99+	2	E
	Non-Halogenated species	86.1	25-99+	2	E

[a] Halogenated species are those containing atoms of chlorine, bromine, fluorine, or iodine. See sections 4.3.2 and 4.3.3 for methods to estimate emissions of SO_2, CO_2, and HCl from control equipment. A control efficiency of 0 should be assumed for mercury.
[b] Background data are given in Appendix C.
[c] Data points are site averages for flares and equipment averages for other equipment that are identical, located at the same site, and fired on the same LFG.
[d] Where information was available on the equipment tested, the data were for enclosed flares. The defaults are assumed to be equally representative of open flares.

Emission factors for secondary compounds exiting a control device are presented in Table 4-8. These emission factors were calculated by dividing the emission rate of each compound (kg/hr) by the volumetric flow rate of methane (dscm/min) entering the control device. The volumetric flow rate of methane entering the control device was calculated by the following equation:

$$V_{CH_4} = V_{lfg} \left(\frac{C_{CH_4}}{1 \times 10^6} \right) \qquad (8)$$

where:

V_{CH_4} = Volumetric flow rate of CH_4, dscm/min;
V_{lfg} = Volumetric flow rate of LFG, dscm/min; and
C_{CH_4} = Concentration of CH_4 in LFG, ppmv.

Emissions can be converted to English units by multiplying both V_{CH_4} and V_{gas} by 35.31 to obtain ft^3/min.

4.3.2 Controlled Emissions of CO_2 and SO_2

Controlled emissions of CO_2 and sulfur dioxide (SO_2) are best estimated using site-specific LFG constituent concentrations and mass balance methods. If site-specific data are not available, data in Tables 4-5 through 4-7 can be used with the mass balance methods that follow.

Controlled CO_2 emissions include emissions from the CO_2 component of LFG (equivalent to uncontrolled emissions) and additional CO_2 formed during the combustion of LFG. The bulk of the CO_2 formed during LFG combustion comes from the combustion of the CH_4 fraction. Small quantities will be formed during the combustion of the NMOC fraction, however, this typically amounts to less than 1 percent of total CO_2 emissions by weight. Also, the formation of CO through incomplete combustion of LFG will result in small quantities of CO_2 not being formed. This contribution to the overall mass balance picture is also very small and does not have a significant impact on overall CO_2 emissions.[112]

Table 4-8. EMISSION FACTORS FOR SECONDARY POLLUTANTS EXITING CONTROL DEVICES

Control Device (SCC)	Pollutant[a]	Emission Rate (kg/hr/dscmm Methane) Minimum	Typical[b]	Maximum	No. of Data Points[c]	Rating
Flare	NO_x	0.013	0.039	0.077	11	C
(50100410)	CO	4.1×10^{-3}	0.72	1.8	15	C
(50300601)	PM	0.013	0.016	0.030	5	D
IC Engine	NO_x	0.15	0.24	0.81	6	D
(50100421)	CO	0.38	0.45	0.56	5	C
	PM	0.046	0.046	0.046	1	E
Gas Turbine	NO_x	0.027	0.083	0.17	4	D
(50100420)	CO	0.092	0.22	0.77	4	E
	PM	0.013	0.021	0.030	2	E
Boiler/Steam Turbine[d]	NO_x	0.026	0.032	0.045	4	D
(50100423)	CO	7.4×10^{-4}	5.4×10^{-3}	0.011	3	E
	PM	6.8×10^{-3}	7.9×10^{-3}	8.6×10^{-3}	3	D

[a] NO_x is expressed as nitrogen dioxide. PM is total particulate, however based on data from other gas-fired combustion sources, most of the particulate matter will be less than 2.5 microns in diameter. See sections 4.3.2 and 4.3.3 for methods to estimate emissions of SO_2, CO_2, and HCl from control equipment.

[b] The arithmetic mean is used as the typical emission rate, unless otherwise denoted. Underlined values indicate the median and double underlined values indicate the geometric mean. Background data and summary statistics are given in Appendix C.

[c] Data points can be averages of identical devices located at the same site (e.g.,boilers) and fired on the same LFG. For flares, equipment located at the same site are were assumed to be similar and site averages serve as data points.

[d] All source tests were conducted on boilers, however, emission factors should also be representative of steam turbines. Emission rates are representative of boilers equipped with low-NO_x burners and flue gas recirculation. No data were available for uncontrolled NO_x emissions.

The following equation which assumes a 100 percent combustion efficiency for CH_4 can be used to estimate CO_2 emissions from controlled landfills:

$$CM_{CO_2} = UM_{CO_2} + \left| UM_{CH_4} * \frac{\eta_{col}}{100} * 2.75 \right| \qquad (9)$$

where:

CM_{CO_2} = Controlled mass emissions of CO_2, kg/yr;

UM_{CO_2} = Uncontrolled mass emissions of CO_2, kg/yr (from equation 4 or the Landfill Air Emission Estimation Model);

UM_{CH_4} = Uncontrolled mass emissions of CH_4, kg/yr (from equation 4 or the Landfill Air Emission Estimation Model);

η_{col} = Efficiency of the LFG collection system, percent; and

2.75 = Ratio of the molecular weight of CO_2 to the molecular weight of CH_4.

Emissions can be converted to English units by multiplying CM_{CO_2}, UM_{CO_2} and UM_{CH_4} by 1.102×10^{-3} to obtain tpy.

To prepare estimates of SO_2 emissions, data on the concentration of reduced sulfur compounds within the LFG are needed. The best way to prepare this estimate is with site-specific information on the total reduced sulfur content of the LFG. Often these data are expressed in ppmv as sulfur (S). Equations 3 and 4 should be used first to determine the uncontrolled mass emission rate of reduced sulfur compounds as sulfur. Then, the following equation can be used to estimate SO_2 emissions:

$$CM_{SO_2} = UM_S * \frac{\eta_{col}}{100} * 2.00 \qquad (10)$$

where:

CM_{SO_2} = Controlled mass emissions of SO_2, kg/yr;

UM_S = Uncontrolled mass emissions of reduced sulfur compounds as sulfur, kg/yr (from eqs. 3 and 4);

η_{col} = Efficiency of the LFG collection system, percent; and

2.00 = Ratio of the molecular weight of SO_2 to the molecular weight of S.

Emissions can be converted to English units by multiplying both CM_{SO_2} and UM_S by 1.102×10^{-3} to obtain tpy.

The next best method to estimate SO_2 concentrations, if site-specific data for total reduced sulfur compounds as sulfur are not available, is to use site-specific data for speciated reduced sulfur compound concentrations. These data can be converted to ppmv as S with equation 11. After the total reduced sulfur as S has been obtained from equation 11, then this value can be used in equation 10 to derive SO_2 emissions.

$$C_S = \sum_{i=1}^{n} C_P * S_P \tag{11}$$

where:

C_S = Concentration of total reduced sulfur compounds, ppmv as S (for use in equation 3);

C_P = Concentration of each reduced sulfur compound, ppmv;

S_P = Number of moles of S produced from the combustion of each reduced sulfur compound (i.e., 1 for sulfides, 2 for disulfides); and

n = Number of reduced sulfur compounds available for summation.

If no site-specific data are available, a value of 46.9 can be assumed for C_S. This value was obtained by using the default concentrations presented in Table 4-5 for reduced sulfur compounds and equation 11. It should be noted that the use of this default value will likely underestimate SO_2 emissions since it is not based on all of the reduced sulfur compounds that may be present in LFG.

4.3.3 Hydrochloric Acid [Hydrogen Chloride (HCl)] Emissions

HCl emissions are formed when chlorinated compounds in LFG are combusted in control equipment. The best methods to estimate emissions are mass balance methods that are analogous to those presented above for estimating SO_2 emissions. Hence, the best source of data to estimate HCl emissions is site-specific LFG data on total chloride [expressed in ppmv as the chloride ion (Cl^-)]. If these data are not available, then total chloride can be estimated from data on individual chlorinated species using equation 12 below. However, emission estimates may be underestimated, since not every chlorinated compound in the LFG will be represented in the laboratory report (i.e., only those that the analytical method specifies).

$$C_{Cl} = \sum_{i=1}^{n} C_P * Cl_P \tag{12}$$

where:

C_{Cl} = Concentration of total chloride, ppmv as Cl^- (for use in equation 3);

C_P = Concentration of each chlorinated compound, ppmv;

Cl_P = Number of moles of Cl^- produced from the combustion of each chlorinated compound (i.e., 3 for 1,1,1-trichloroethane); and

n = Number of chlorinated compounds available for summation.

After the total chloride concentration (C_{Cl}) has been estimated, equations 3 and 4 should be used to determine the total uncontrolled mass emission rate of chlorinated compounds as chloride ion (UM_{Cl}). This value is then used in equation 13 below to derive HCl emission estimates:

$$CM_{HCl} = UM_{Cl} * \frac{\eta_{col}}{100} * 1.03 * \left(1 - \frac{\eta_{cnt}}{100} \right) \tag{13}$$

where:

CM_{HCl} = Controlled mass emissions of HCl, kg/yr;

UM_{Cl} = Uncontrolled mass emissions of chlorinated compounds as chloride, kg/yr (from eqs. 3 and 4);

η_{col} = Efficiency of the LFG collection system, percent;

1.03 = Ratio of the molecular weight of HCl to the molecular weight of Cl^-; and

η_{cnt} = Control efficiency of the LFG control or utilization device, percent.

Emissions can be converted to English units by multiplying both CM_{HCl} and UM_{Cl} by 1.102×10^{-3} to obtain tpy.

In estimating HCl emissions, it is assumed that all of the chloride ion from the combustion of chlorinated LFG constituents is converted to HCl. If an estimate of the control efficiency, η_{cnt}, is not available, then the high end of the control efficiency range for the equipment listed in Table 4-7 should be used. This assumption is recommended so that HCl emissions are not under-estimated.

If site-specific data on total chloride or speciated chlorinated compounds are not available, then a default value of 42.0 ppmv can be used for C_{Cl}. This value was derived from the default LFG constituent concentrations presented in Table 4-5. As mentioned above, use of this default may produce underestimates of HCl emissions since it is based on only those compounds for which analyses have been performed. The constituents listed in Table 4-5 are likely not all of the chlorinated compounds present in LFG.

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5.0 AP-42 SECTION 2.4

Section 2.4 of AP-42 is presented in the following pages as it would appear in the document.

Appendix A

Summary of Test Report Data

The Lotus (APPXAX~.WK3) or Excel (APPXAX~.XLS) Spreadsheet contains the Appedix A information which follows.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
1	Scholl Canyon	California	Benzene Carbon dioxide Carbon tetrachloride Chloroform Methane PCE TCA TNMHC Toluene Vinyl chloride	Flare	Benzene Carbon dioxide Carbon tetrachloride Chloroform Methane PCE TCA TNMHC Toluene Vinyl chloride	Test date 8/1/86. 2 of 4 flares operating day of test.
3	Palos Verdes	California		Turbine/flare	1,1-Dichloroethene 1,2-Dichloroethane Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbonyl sulfide Dimethyl sulfide Ethyl mercaptan Hydrogen sulfide Methane Methyl mercaptan Nitrogen oxides PCE TCA TCE Toluene Vinyl chloride	Test date 3/6/84. CO determined by TCA Method.
4	Puente Hills	California	Carbon dioxide Methane Oxygen TNMHC	Turbine	Carbon dioxide Carbon monoxide Nitrogen oxide Oxygen Sulfur dioxide THC Total particulate	Test dates 7/31/84 and 8/3/84; results from two turbines.
5	Mountaingate	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE t-1,2-Dichloroethene TCA TCE Toluene Vinyl chloride	Flare		Test date 10/15/84. Flare not operative day of testing.
6	Bradley Pit	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan PCE t-1,2-Dichloroethene TCA TCE Toluene Vinyl chloride	Boiler/flare		Test date 2/15/85. Gas (and test results) from active and inactive sections of landfill.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
7	Calabasas	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE t-1,2-Dichloroethene TCA TCE Toluene Vinyl chloride	Flare	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE t-1,2-Dichloroethene TCA TCE Toluene Vinyl chloride	Test dates 7/31/85, 9/4/84. 6 flares operating, station #1 sampled both dates.
8	Operating Industries	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE TCA TCE Toluene Vinyl chloride	Flare	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE TCA TCE Toluene Vinyl chloride	Test date 9/11/85. 82 wells, 3 flares. Tested 1 flare. CO determined by TCA Method.
9	Sheldon Street	California	Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE TCA TCE Toluene Vinyl chloride	Flare	Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE TCA TCE Toluene Vinyl chloride	Test date 11/5/85. Landfill inactive for 10 years; two gas collection and flare stations. One flare tested. CO determined by TCA Method.
10	Mission Canyon	California	Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE TCA TCE Toluene Vinyl chloride	Flare	Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE TCA TCE Toluene Vinyl chloride	Test date 12/6/85. Inactive landfill. CO determined by TCA Method.
12	BKK Corporation	California	TCA 1,2-Dichloroethane Benzene Carbon monoxide Carbon tetrachloride Chloroform Furans Methylene chloride Nitrogen oxides PCE TCE Toluene Vinyl chloride	Flare	TCA 1,2-Dichloroethane Benzene Carbon monoxide Carbon tetrachloride Chloroform Dioxins Furans HCl Methylene chloride Nitrogen oxides PCE Toluene	Test dates 3/3/86 through 3/7/86; tested Flare #6. CO determined by TCA Method.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
13	Syufy Enterprises	California	Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE TCA TCE Toluene Vinyl chloride	Flare	Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE TCA TCE Toluene Vinyl chloride	Test date 7/10/86. Lines from peripheral and interior wells combined. Inactive landfill.
15	Azusa Land Reclamation	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon disulfide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan PCE TCA TCE Toluene Vinyl chloride	Flare	TCA Benzene Carbon tetrachloride Chloroform PCE TCE Toluene Vinyl chloride	Test dates 6/17/83, 8/29/84, 11/1/84, 7/12/85, 5/7/86. Sales gas results combined with raw gas results as uncontrolled.
17	Bradley Pit	California	1,1-Dichloroethene 1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Methane PCE TCA TCE Toluene Vinyl chloride	Boiler/flare		Test date 3/20/84. Active and inactive landfill sections. Flare not operating.
18	Puente Hills	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform PCE t-1,2-Dichloroethene TCA TCE Toluene Vinyl chloride	Flare/turbine	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE TCA TCE Toluene Vinyl chloride	Test date 2/6/85. Active landfill; two gas collection systems and stations. Test conducted at West flaring station (18 flares and 2 turbines). CO determined by TCA Method.
19	Bradley Pit	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Dimethyl sulfide Methane Methyl mercaptan PCE Sulfur dioxide t-1,2-Dichloroethene TCA TCE Toluene Vinyl chloride	Boiler/flare		Test date 12/14/84. Active and inactive landfill sections. Flare not operating.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
20	Penrose	California	TCA 1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane PCE t-1,2-Dichloroethene TCE Toluene Vinyl chloride	Boiler/flare		Test date 7/11/84. Inactive landfill; 5 gas collection lines and flares. Flares not sampled due to upcoming modifications.
22	Palos Verdes	California	TCA 1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE TCE Toluene Vinyl chloride	Flare	TCA 1,2-Dichloroethane Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Methane Oxygen PCE TCE Toluene Vinyl chloride	Test date 8/14/85. Inactive landfill, 3 flare stations and one turbine. CO determined by TCA Method.
23	Toyon Canyon	California	TCA Benzene Carbon dioxide Carbon tetrachloride Chloroform Methane PCE TCE TNMHC Toluene Vinyl chloride	ICE	Benzene Carbon dioxide Carbon disulfide Carbon tetrachloride Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan Nitrogen dioxide PCE	Test date 5/16/86. Inactive landfill, 5 ICE's.
24	Puente Hills	California	TCA Benzene Carbon monoxide Carbon tetrachloride Chloroform Dioxins Furans PCE TCE Toluene Vinyl chloride	Flare	TCA Benzene Carbon monoxide Carbon tetrachloride Chloroform Dioxins Furans HCl Nitrogen oxide PCE Sulfur dioxide TCE Toluene Vinyl chloride	Test dates 2/18/86 through 2/21/86. Flare operating at steady state.
26	Confidential	Wisconsin	Carbon dioxide Methane Nitrogen Oxygen TNMOC	Turbine		Test date 8/6/90. U.S. EPA Office of Research and Development.
26	Confidential	Illinois	Carbon dioxide Methane Nitrogen Oxygen TNMOC	Turbine		Test date 8/7/90. U.S. EPA Office of Research and Development.
26	Confidential	Pennsylvania	Carbon dioxide Methane Nitrogen Oxygen TNMOC	Turbine		Test date 8/8/90. U.S. EPA Office of Research and Development.
26	Confidential	Florida	Carbon dioxide Methane Nitrogen Oxygen TNMOC	Turbine		Test date 8/20/90. U.S. EPA Office of Research and Development.
26	Confidential	California	Carbon dioxide Methane Nitrogen Oxygen TNMOC	Flare		Test date 8/23/90. U.S. EPA Office of Research and Development.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
26	Confidential	California	Carbon dioxide Methane Nitrogen Oxygen TNMOC	ICE		Test date 8/24/90. U.S. EPA Office of Research and Development.
27	Lyon Development	Michigan	TCA 1,1-Dichloroethane 1,2-Dichloroethane Benzene Carbon disulfide Carbon tetrachloride Carbonyl sulfide Chlorobenzene Chloroform Dimethyl disulfide Dimethyl sulfide Ethylbenzene Hydrogen sulfide m+p-Xylene Methyl mercaptan Methylene chloride o-Xylene PCE t-1,2-Dichloroethene TCE Toluene Vinyl chloride	None		Test date 8/21/90. Two wells sampled by canister.
41	Bradley Pit	California	TCA Benzene Butane Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Ethane Heptanes Hexanes Methane Nitrogen Nonanes Octanes Oxygen PCE Pentane Propane TCE TNMHC Toluene Vinyl chloride	Boiler/flare	TCA Benzene Butane Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Ethane Heptanes Hexanes Methane Nitrogen Nonanes Octanes Oxygen PCE Pentane Propane TCE TNMHC Toluene Vinyl chloride	Test dates 10/2/85 and 1/24/86. Questionnaire response. Scrubber operative 10/2/85. Flare operativewith no visible flame 1/24/86 test. CO determined by TCA Method.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
41	Guadalupe Landfill		1,1-Dichloroethene 1,2 Dimethyl cyclohexane 1,3 Dimethyl cyclohexane 1-Butanol 1-Propanol 2,4 Dimethyl heptane 2-Butanol 2-Butanone 2-Methyl-methylester 2-Methyl heptane 2-Methyl propane 2-Propanol 3-Carene Butylester butanoic acid Carbon dioxide Chloroethene Dichloromethane Ethanol Ethyl benzene Ethylester acetic acid Ethylester propanoic acid Hydrogen Isooctanol Methane Methylester acetic acid Methylester butanoic acid Nitrogen Oxygen Propane Propanoic acid Propylester acetic acid Propylester butanoic acid Tetrachloroethene Tetrahydrofuran Thiobismethane TNMHC Toluene Trichloroethene Xylene	ICE	1,1-Dichloroethene 1,2 Dimethyl cyclohexane 1,2,4-Trimethyl cyclopentane 1,3 Dimethyl cyclohexane 1-Butanol 1-Propanol 2,4 dimethyl heptane 2-Butanol 2-Butanone 2-Methyl-methylester 2-Methyl heptane 2-Methyl propane 2-Propanol 3-Carene Butane Butylester butanoic acid Carbon dioxide Chlorodifluoromethane Chloroethene Dichloromethane Ethanol Ethyl benzene Ethylester acetic acid Ethylester propanoic acid Furan Hydrogen Isooctanol Methane Methylester acetic acid Methylester butanoic acid Nitrogen Oxygen Propane Propanoic acid Propylester acetic acid Propylester butanoic acid Tetrachloroethene Tetrahydrofuran Thiobismethane TNMHC Toluene Trichloroethene	Test date 7/25/84. Questionnaire response.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
43	34- Confidential	Confidential	TCA 1,1,2,2-Tetra-chloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichlorobenzene 1,2-Dichloroethane 1,2-Dichloropropane 1,3-Dichlorobenzene 1,3-Dichloropropane 1,4-Dichlorobenzene 2-Chloroethylvinyl ether Acetone Acrolein Acrylonitrile Benzene Bromodichloromethane Bromoform Bromomethane Butane Carbon dioxide Carbon tetrachloride Chlorobenzene Chlorodibromomethane Chlorodifluoromethane Chloroethane Chloroform Chloromethane Dichlorodifluoromethane Ethanol Ethylbenzene Flurotrichloromethane Hexane Methane Methyl ethyl ketone Methyl isobutyl ketone Methylene chloride Pentane Propane t-1,2-Dichloroethene Tetrachloroethene Toluene Trichloroethene Vinyl chloride Xylene	Varies-- uncontrolled data only.		
48	Calabasas Landfill	California	TCA Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan PCE TCE TNMHC Toluene Vinyl chloride	Flare	TCA Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan PCE TCE TNMHC Toluene Vinyl chloride	Test date 10/9/87. Active landfill; 6 flares, 3 operational day of testing.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
49	Scholl Canyon	California	TCA Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane PCE TCE TNMHC Toluene Vinyl chloride Xylene	Flare	TCA Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane PCE TCE TNMHC Toluene Vinyl chloride Xylene	Test date 10/15/87. Active landfill, 4 operational flares and 2 standbys. Flare #2 tested.
50	Puente Hills	California	TCA 1,2 Dichloroethane Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan PCE t-1,2 Dichloroethene TCE TNMHC Toluene Trichloroethane Vinyl chloride Xylene	Turbine/flare	TCA 1,2 Dichloroethane Benzene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chloroform Dimethyl sulfide Hydrogen sulfide Methane Methyl mercaptan PCE t-1,2 Dichloroethene TCE TNMHC Toluene Trichloroethane Vinyl chloride Xylene	Test date 12/1/87. Active landfill, tested flare #23 and solar turbine tested.
51	Palos Verdes	California	TCA Benzene Carbon tetrachloride Chloroform Hydrogen sulfide Methane PCE TCE TNMHC Toluene Vinyl chloride Xylene	Flare	TCA Benzene Carbon dioxide Carbon monoxide Carbon tetrachloride Chloroform Hydrogen sulfide Methane PCE TCE TNMHC Toluene Vinyl chloride Xylene	Test date 11/16/87. Inactive landfill, 3 flare stations (flare station 1 not operating day of testing). Flare stations 2 and 3 tested.
53	Altamont	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon tetrachloride Chloroform Ethylene dibromide Methane Methyl chloroform Methylene chloride Nitrogen Oxygen PCE TCA TCE Vinyl chloride	Flare	Carbon dioxide Carbon monoxide NOx Oxygen THC TNMOC	Test date: 4/7/88. O2 determined by BAAQMD Method ST-14. CO2 determined by BAAQMD Method ST-5. NOx determined by BAAQMD Method ST-13A. THC and THMOC determined by BAAQMD Method ST-7. CO determined by BAAQMD Method ST-C.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
54	Arbor Hills	Michigan	1,1-Dichloroethane 1,2-Dichloroethane Benzene Carbon disulfide Carbon tetrachloride Carbonyl sulfide Chlorobenzene Chloroform Dimethyl disulfide Dimethyl sulfide Ethylbenzene Ethylene dibromide Hydrogen sulfide Methyl chloroform Methyl mercaptan Methylene chloride PCE TCE Toluene Vinyl chloride Vinylidene chloride Xylenes	Flare	1,1-Dichloroethane 1,2-Dichloroethane Benzene Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chlorobenzene Chloroform Dimethyl disulfide Dimethyl sulfide Ethylbenzene Ethylene dibromide HCL Hydrogen sulfide Methyl chloroform Methyl mercaptan Methylene chloride NOx PCB PCE Quartz TCE TNMOC Toluene Vinyl chloride Vinylidene chloride Xylenes Zinc	
55	BFI Facility, Chicopee	MA	1,1-Dichloroethane 1,2-Dichloroethane Benzene Benzyl chloride Carbon tetrachloride Chlorobenzene Chloroform Dichlorobenzene Dichloromethane Dimethyl sulfide Ethyl mercaptan Hydrogen sulfide Methyl chloroform Methyl mercaptan PCE TCE Toluene Vinyl chloride Vinylidene chloride Xylene	Flare	1,1-Dichloroethane 1,2-Dichloroethane Benzene Benzyl chloride Carbon monoxide Carbon tetrachloride Chlorobenzene Chloroform Dichlorobenzene Dichloromethane Dimethyl sulfide Ethyl mercaptan HCl Hydrogen sulfide Methyl chloroform Methyl mercaptan NOx PCE TCE Toluene Vinyl chloride Vinylidene chloride Xylene	Test date: 7/15/90. NOx determined by EPA Method 7A.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
56	Coyote Canyon	California	1,1-Dichloroethane 1,1-Dichloroethylene 1,2-Dichloroethane Acetonitrile Benzene Benzyl chloride Carbon disulfide Carbon tetrachloride Chlorobenzene Chloroform Dichlorobenzene Dichloromethane Dimethyl disulfide Dimethyl sulfide Ethyl mercaptan Hydrogen sulfide Methane Methyl chloroform Methyl mercaptan PCE Sulfur TCA TCE TGNMO Toluene Vinyl chloride Xylenes	Boiler/Flare	1,1-Dichloroethane 1,1-Dichloroethylene 1,2-Dichloroethane Acetonitrile Arsenic Benzene Benzyl chloride Beryllium Cadmium Carbon disulfide Carbon monoxide Carbon tetrachloride Chlorobenzene Chloroform Chromium Copper Dichlorobenzene Dichloromethane Dimethyl disulfide Dimethyl sulfide Ethyl mercaptan Formaldehyde HCl Hydrogen sulfide Manganese Mercury Methane Methyl chloroform Napthalene Nickel Nitrogen NOx Oxygen PAH Particulate matter PCE Selenium Sulfur dioxide TCE TGNMO Toluene Total chromium Vinyl chloride Xylenes	Test date: 6/6 -14/91. Tested flare #1. Test results were evaluated seperately for Low flow & High flow rate runs. NOx & CO were analyzed using CARB Method 100 (Chamilum & GFC NDIR).
57	Durham Rd.	California	1,2-Dichloroethane Benzene Carbon dioxide Carbon tetrachloride Chloroform Ethylene dibromide Methane Methyl chloroform Methylene chloride Nitrogen Oxygen PCE TCE Vinyl chloride	Flare	1,2-Dichloroethane Benzene Carbon dioxide Carbon tetrachloride Chloroform Ethylene dibromide Methane Methyl chloroform Methylene chloride Nitrogen Oxygen PCE TCE Vinyl chloride	Test date: 9/1/88. O2 and CO2 determined by BAAQMD Method ST-24.
58	Otay	California	Benzene Carbon tetrachloride Chloroform Ethylene dibromide Ethylene dichloride Methyl chloroform Methylene chloride PCE TCE Vinyl chloride	Engine	Benzene Carbon tetrachloride Chloroform Ethylene dibromide Ethylene dichloride Methyl chloroform Methylene chloride PCE TCE Vinyl chloride	Test date: June 87.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
59	Rockingham	Vermont	1,1,2.2-Tetrachloroethane 1,1-Dichloroethane 1,2-Dichloroethane Acetone Acrylonitrile Benzene Carbon tetrachloride Chlorobenzene Chloroform Dichlorobenzene Ethyl benzene Methyl chloroform Methyl ethyl ketone Methylene chloride PCE Sulfur dioxide TCE Toluene Vinyl chloride Xylenes	Flare	1,1,2.2-Tetrachloroethane 1,1-Dichloroethane 1,2-Dichloroethane Acetone Acrylonitrile Benzene Carbon tetrachloride Chlorobenzene Chloroform Dichlorobenzene Ethyl benzene HCl HF Methyl chloroform Methyl ethyl ketone Methylene chloride NMO PCE Sulfur dioxide TCE TNMOC Toluene Vinyl chloride Xylenes	Test date: 8/9-10/90. SO2 determined by EPA Method 8.
60	Sunshine Canyon	California	2-Propanol benzene Butane Dimethyl sulfide Ethanol Ethyl benzene Ethyl mercaptan Hydrogen sulfide Methane Methyl mercaptan PCE Phenol Propyl mercaptan TCE Toluene Xylenes	Flare	2-Propanol Butane Carbon monoxide Dimethyl sulfide Ethanol Ethyl benzene Ethyl mercaptan HCl Hydrogen sulfide Methane Methyl mercaptan Nitrogen NOx Oxygen PCE Perticulates Phenol Propyl mercaptan SOx TCE TNMOC Toluene Xylenes	Test date: 5/21-22/90. NOx & CO were analyzed using CARB Method 100.
61	Pinelands	New Jersey	Methane	Flare	Carbon dioxide Carbon monoxide Methane Oxygen THC TNMOC	Test date: 2/28/92. CO analyzed by EPA Method 10.
62	Greentree	Pennsylvania		Flare	TNMHC Methane NOx	Test date: 4/22-23/92. NOx determined by EPA Method. 7D. CH4 content estimated.
63	Kappaa Quarry	Hawaii		Gas Turbine	Carbon monoxide NOx Sulfur dioxide	Test date: 12/28/93. NOx & CO were analyzed by EPA Method 20 & 3.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
64	Johnston	Rhode Island	Argon Carbon Carbon dioxide Carbon monoxide Ethane Ethene Helium Heptane Hexane Hydrogen Hydrogen sulfide Isobutane Methane n-Pentane Nitrogen NOx Oxygen Propane Propylene TNMHC	IC Engine	Carbon monoxide NOx TNMHC	Test date: 6/4-66/91. Lean combustion. NOx & CO were analyzed by EPA Method 10 &7E (Chemilume & NDIR).
65	CID	Illinois		Gas Turbine	Carbon monoxide Oxygen	Test date: 8/8/89. EPA Method 101
66	CID	Illinois		Gas Turbine	NOx Oxygen Sulfur dioxide	Test date: 7/12-14/89. EPA Method 20.
67	BFI Facility, Chicopee	MA		IC Engine	Carbon monoxide NOx Oxygen Sulfur dioxide TGNMO	Test date: 121493/ Lean combustion. NOx, SO2 & CO determined by EPA Method 7E, 6C and 10.
68	BFI Facility, Richmond	Virginia		IC Engine	Carbon dioxide NOx Oxygen	Test date: 4/22-23/92. NOx determined by EPA Method 7E. O2 and CO2 determined by EPA Method 3A. No engine description.
69	Arizona St.	California	1,2-Dibromoethane 1,2-Dichloroethane Benzene Carbon tetrachloride Chloroform Methyl chloroform Methylene chloride PCE TCE Vinyl chloride	Flare	1,2-Dibromoethane 1,2-Dichloroethane Benzene Carbon monoxide Carbon tetrachloride Chloroform Methyl chloroform Methylene chloride NOx Particulates PCE TCE TNMHC Vinyl chloride	Test date: 6/25-26/90. Methane content unknown. NOx and CO determined by SDAPCD Method 20.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
70	Puente Hills	California	TCA 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dibromoethane 1,2-Dichloroethane Acetonitrile Benzene Benzyl chloride Carbon disulfide Carbon tetrachloride Carbonyl sulfide Chlorobenzene Chloroform Dimethyl disulfide Dimethyl sulfide Ethyl mercaptan Hydrogen sulfide m-Dichlorobenzene m-Xylenes Methane Methyl mercaptan Methylene chloride o+p Xylene TCE PCE Toluene Vinyl chloride	Boilers	TCA 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dibromoethane 1,2-Dichloroethane Acetonitrile Benzene Benzyl chloride Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chlorobenzene Chloroform Dimethyl disulfide Dimethyl sulfide Ethyl mercaptan Hydrogen sulfide m-Dichlorobenzene m-Xylenes Methane Methyl mercaptan Methylene chloride NMOC o+p Dichlorobenzene o+p Xylene Sulfur dioxide TCE PCE Toluene Vinyl chloride	Test date: 9/29/93. NOx & CO were analyzed using SCAQMD Method 100.
71	CID	Illinois		Turbine	Carbon Oxygen TGNMO	Test date: 2/16/90. O2 and CO2 determined by EPA Method 3. TGNMO determined by EPA Method (modified) 25.
72	Tazewell	Illinois		Engine	Carbon monoxide TGNMO NO2 Sulfur dioxide	Test date: 2/22-23/90. SO2 determined by EPA Method 6C. NOx determined by EPA Method 7E. CO determined by EPA Method10A.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
73	Scottsville	New York		Engine	1,1,2,2-Tetrachloroethane 1,1,2-Tricitloroethane 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichloroethane 1,2-Dichloropropene 1,3-Dichloropropene 2'-Chloroethyl vinyl ether Acetone Acrolein Acrylonitrile Benzene Bromodichloromethane Bromoform Bromomethane Carbon monoxide Carbon monoxide Carbon tetrachloride Chlorobenzene Chlorodibromomethane Chloroethane chloroform Chloromethane Dichlorodofluoromethane Ethane Ethylbenzene Flourotrichloromethane Mercaptans Methyl ethyl keytone Methylene chloride n-Butane n-Hexane n-Pentane NO2 Particulates Propane Sulfur dioxide TCA Tetra chloroethane TGNMO TNMHC Toluene Trans -1,2-dichloroethene Trichloroethene Vinyl chloride Xylene	Test date: 5/2/90. Engine No. 2 was used. SO2 determined by EPA Method 6C. NOx determined by EPA Method 7E. CO determined by EPA Method10A. O2 and CO2 determined by EPA Method 3A. Particulates determined by EPA Method 5. VOC was determined by EPA Methods 5040/8240.
74	Tripoli	New York		IC Engine	Carbon monoxide NOx Sulfur dioxide TNMHC	Test date: 4/3-5/89.
75	Oceanside	New York	Hydrogen sulfide	IC Engine	Carbon monoxide NOx Oxygen TNMHC TSP	Test date: 10/6-7/92. NOx & CO were analyzed by EPA Method 7E & 10.
76	Dunbarton Rd.	New Hampshi	Carbon dioxide Carbon monoxide Hydrogen Methane Nitrogen Oxygen	IC Engine	Carbon dioxide Carbon monoxide Hydrogen Methane NOx Oxygen	Test date: 6/5/90. NOx & O2 were analyzed by EPA Method 20. CO analyzed by EPA Method 10.
77	Palo Alto	California	1,1-Dichloroethane Acetone Benzene Bromomethane Carbon dioxide Carbon monoxide Ethyl benzene Methane Methylene chloride Nitrogen Oxygen PCE TCE Toluene Xylenes	Engine	Benzene Carbon dioxide Carbon monoxide Methane NOx Oxygen THC TNMOC VOC	Test date: 6/2/93. Engines No. 1 and 2 used. NOx, O2, CO2, CO, and THC were determined by CARB Method 1-100.

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
78	Northeast	Rhode Island	Carbon dioxide Ethane Hexane Isobutane Isopentane Methane n-Butane Nitrogen Propane	Engine	Carbon dioxide Carbon monoxide Methane NOx Oxygen TNMHC	Test date: 5/25/94. Engine No. 5 used. O2 and CO2 analyzed by EPA Method 3A. NOx analyzed by EPA Method 7E. CO analyzed by EPA Method 10. TNMHC analyzed by EPA Method 18.
79	Johnston	Rhode Island	Argon Carbon Carbon dioxide Carbon monoxide Ethane Ethene Helium Heptane Hexane Hydrogen Hydrogen sulfide Isobutane Methane n-Pentane Nitrogen NOx Oxygen Propane Propylene TNMHC	Engine	Carbon dioxide Carbon monoxide Methane NOx Oxygen THC TNMHC	Test date: 10/9-16/90, and 11/6/90.
80	Bonsal	California		Flare	Carbon monoxide NOx Particulate matter Sulfur dioxide TNMHC TOG	Test date: 4/94. TNMHC determined by EPA Method 25.
81	Hillsborough	California		Flare	Carbon monoxide NOx Particulate matter Sulfur dioxide TNMHC TOG	Test date: 1/94. TNMHC determined by EPA Method 25.
82	Arizona Street	California		Flare	1,2-dibromoethane 1,2-Dichloroethane Benzene Carbon monoxide Carbon tetrachloride Chloroform Methylene chloride NOx Particulates Sulfur dioxide TCA Tetrachloroethene TNMHC Trichloride Trichloroethene Vinyl chloride	Test date: 3/30-4/7/92. NOx and Carbon monoxide analyzed by SDAPCD Method 20.
83	San Marcos	California		Turbine	Carbon dioxide Carbon monoxide NOx Oxygen	Test date: 3/30/93. Engine No. 1 used. SDAPCD Methods 3A and 20.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
84	Otay	California	Benzene	Engine	Benzene	Test date: 10/20-22/87.
			Dichloromethane		Carbon dioxide	
			Hydrogen chloride		Carbon monoxide	
			Methylene chloride		Carbon tetrachloride	
			Sulphur		Chloroform	
			Vinyl chloride		Dichloromethane	
					EDB	
					EDC	
					Formaldehyde	
					HCl	
					Hydrogen chloride	
					Methyl chloroform	
					Methylene chloride	
					NOx	
					Oxygen	
					PCE	
					TCE	
					TNMHC	
					Vinyl chloride	
85	San Marcos	Cakifornia	Benzene	Turbine	Benzene	Test date: 6/26-27/89.
			Carbon tetrachloride		Carbon monoxide	
			Chloroform		NOx	
			Ethylene dibromide		Sulfur dioxide	
			Methylene chloride		Vinyl chloroide	
			PCE		Vinylidene chloride	
			TCA			
			TCE			
			Vinyl chloroide			
			Vinylidene chloride			
87	Puente Hills	California	PCB	Flare	Carbon dioxide	Test date:
					Carbon monoxide	Flare No. 11 was used.
					HCl	
					Methane	
					NOx	
					Oxygen	
					PCDD	
					PCDF	
					Sulfur dioxide	
					TNMHC	
					TOC	
					Water	
88	Spradra	California	1,1-Dichloroethane	Boiler	1,1-Dichloroethane	Test date: 7/25/90.
			1,1-Dichloroethane		1,1-Dichloroethane	
			1,1-Dichloroethene		1,1-Dichloroethene	
			1,2-Dichlorobenzene		1,2-Dichlorobenzene	
			1,3-Dichlorobenzene		1,3-Dichlorobenzene	
			1,4-Dichlorobenzene		1,4-Dichlorobenzene	
			Acetronitrile		Acetronitrile	
			Ammonia		Benzene	
			Benzene		Benzyle chloride	
			Benzyle chloride		Carbon monoxide	
			Carbon dioxide		Carbon tetrachloride	
			Carbon monoxide		Chlorobenzene	
			Carbon tetrachloride		Chloroform	
			Chlorobenzene		Methylene chloride	
			Chloroform		NOx	
			HCl		PAH	
			Methylene chloride		Sulfur dioxide	
			NOx		TCA	
			Sulfur dioxide		Trichloroethene	
			TCA		Vinyl chloride	
			Trichloroethene		Xylenes	
			Vinyl chloride			
			Xylenes			

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
89	Oxnard	California	Arsenic Beryllium Cadmium Chromium Copper Lead Maganese Mercury Nickel Selenium Zinc	IC Engine	Acenaphthene Acenaphthylene Anthracene Arsenic Benzo(a)anthracene Benzo(a)pyrene Benzo(b)floranthene Benzo(g,h,i)perylene Benzo(k)floranthene Beryllium Cadmium Chromium Chrysene Copper Dibenz(a,h)anthracene Fluoranthene Fluorene Formaldehyde HCl Hydrogen fluoride Indeno(1,2,3-cd)pyrene Lead Manganese Mercury Naphthalene Nickel Phenanthrene Pyrene Selenium Zinc	Test date: 7/23-27/90. PAH determined by CARB Method 429. Formaldehyde determined by CARB Method 430. Metals determined by CARB Method 436. Arsenic determined by CARB Method 423. Cromium determined by CARB Method 425. HCl determined by CARB Method 421. HF determined by EPA Method 13B.
90	Oxnard	California		Engine	TCA 1,1,2-Trochloroethane 1,1-Dichloroehtene 1,1-Dichloroethane 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,4-Dichlorobenzene 1,4-Dioxane 2-Butanone, MEK 2-Hexanone 2-Methyl phenol 3,4-Methyl phenol 4-Methyl-2-Pentanone, MIBK Acetaldehyde Acetone Acrolein Acrylonitrile Benzene Bromodichloromethane Butane Carbon dioxide Carbon disulfide Carbontetrachloride Chlorobenzene Chloroethane Chloroform Chloromethane Chloropicrin Dibromochloromethane Dichlorobenzene Dichloromethane Ethane Ethylbenzene Formaldehyde Hexane Hydrogen sulfide Hydrogen sulfide Methane Pentane Phenol Propane	Test date: 10/16/90. Benzene determined by CARB Method 422. Formaldehyde, Acrolin, and Acetaldehyde determined by CARB Method 430. Phenol determined by BAAQMD ST-16.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
91	Oxnard	California	Carbon dioxide Carbon monoxide Ethane Hexane Hydrogen sulfide Hydrogen sulfide iso-Butane iso-Pentane Methane n-Butane n-Pentane Nitrogen Oxygen Propane Sulfur	Engine	Styrene TCE Tetrachloroethene Toluene Trichlorofluoromethane Trichlorotrifluoroethane Vinyl chloride Xylenes	Test date: 12/20/90. Hydrocarbons determined by EPA Method 18. O2, N2, and CO2 determined by EPA Method 3.

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
92	Salinas	California		Engine	1,1,2-Trochloroethane 1,1-Dichloroehtene 1,1-Dichloroethane 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,4-Dichlorobenzene 1,4-Dioxane 2-Butanone, MEK 2-Hexanone Acenaphthene Acenaphthylene Acetone Acrylonitrile Anthracene Arsenic Benzene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)floranthene Benzo(g,h,i)perylene Benzo(k)floranthene Beryllium Bromodichloromethane Cadmium Carbon disulfide Carbontetrachloride Chlorobenzene Chloroethane Chloroform Chloromethane Chloropicrin Chromium Chrysene Copper Cristobalite Dibenz(a,h)anthracene Dibromochloromethane Dichloromethane Ethylbenzene Fluoranthene Fluorene HCl Hydrogen sulfide Indeno(1,2,3-cd)pyrene Lead Manganese Mercury Naphthalene Nickel Phenanthrene Phenols Phosphorus Pyrene Quartz Selenium Styrene TCA TCE Tetrachloroethene Toluene Trichlorofluoromethane Trichlorotrifluoroethane Tridymite Vinyl chloride Xylenes Zinc	Test date: 7/31-8/2/90. PAH determined by CARB Method 429. Formaldehyde, Acrolein, and Acetaldehyde determined by CARB Method 430. Metals determined by CARB Method 436. Cadnium determined by CARB Method 424. Cromium determined by CARB Method 425. HCl determined by CARB Method 421. Silica determined by EPA Method 5. PCB determined by EPA Method 608/8080.
93	Newby Island	California			Carbon dioxide Carbon monoxide NOx Oxygen THC TNMHC	Test date: 2/7-8/90. Active landfill. CARB Method 1-100 was used.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
94	Various	Various	1,1-dichloroethane 1,1-dichloroethylene 1,2-dichloroethylene Benzene Chlorobenzene Dichloromethane Hexane Iso-octane Iso-propylbenzene m,p-xylene Methylbenzene Napthalene Nonane o-xylene Pentane TCA Tetrachloroethene Trichloroethene	Various	1,1-dichloroethane 1,1-dichloroethylene 1,2-dichloroethylene Benzene Carbon dioxide Chlorobenzene Dichloromethane Hexane Iso-octane Iso-propylbenzene m,p-xylene Mercury Methane Methylbenzene Napthalene Nitrogen Nonane Oxygen o-xylene Pentane TCA Tetrachloroethene Trichloroethene	
95	Minnesota Counties; "Greater Minnesota" and "Twin Cities Metropolitan Area"	Minnesota		Flare	1,1-dichloroethane 1,1-dichloroethylene 1,2-Dichloroethane 1,2-dichloroethylene Carbon dioxide Carbon disulfide Carbon monoxide Carbon tetrachloride Carbonyl sulfide Chlorobenzene Chloroform Dimethyl disulfide Dimethyl sulfide Ethyl mercaptan HAP HCl Hydrogen sulfide Mercury Methane Methyl mercaptan Methylene chloride Nitrogen Nitrogen dioxide NMOC Perchloroethylene PM Sulfur dioxide TCA Trichloroethylene Vinyl chloride	Test date: 7/90 to 5/91, and 1-11/92.
96	Fresh Kills	New York	Mercury			Test date: 11/96. EPA Method 101A and SW-846 Method 7471 were used.
97	Mountaingate	California	PM Antimony Arsenic Barium Beryllium Cadmium Chromium Copper Lead Manganese Mercury Nickel Selenium Silver Thallium Zinc			Test date: 5/18-21/92.

Appendix A. Summary of Test Report Data

Ref. No.	Landfill Name	Location	Compounds Tested (Uncontrolled)	Control Device	Compounds Tested (Controlled)	Comments
98	Bakersfield	California	NMHC Butane Ethane Methane Pentane Propane	IC Engine	NMHC Butane CO Ethane Methane NOx Pentane PM Propane	Test date 12/4/90.
99	Otay Landfill	California	NMHC	IC Engine	NMHC CO NOx PM	Test date 4/2/91.
100	Penrose	California	NMHC Methane Perchloroethylene Trichloroethylene	IC Engine	NMHC Methane Perchloroethylene Trichloroethylene	Test date 2/24/88.
101	Toyon Canyon	California	1,1,1-Trichloroethylene Benzene Methane Perchloroethylene Toluene Trichloroethylene Xylene	IC Engine	1,1,1-Trichloroethylene Benzene Methane Perchloroethylene Toluene Trichloroethylene Xylene	Test date 3/8/88.
104	Y & S Maintenance	Pennsylvania	CO CO2 Methane NMHC NOx	Flare	CO CO2 Methane NMHC NOx	Test date 12/14/94. NOx was determined by EPA Method 7D.
105	Seneca Landfill	Pennsylvania	CO CO2 Methane NMHC Oxygen	Flare	CO CO2 Methane NMHC NOx	Test date 9/8/93. NOx and NMHC were determined by EPA Methods 7D and 25C, repectively.
106	Wayne Township	Pennsylvania	CO CO2 Methane NMVOC Oxygen	Flare	CO CO2 Methane NMVOC NOx Oxygen	Test date 4/2/96. NOx and NMVOC were determined by EPA Methods 7D and TO-14, repectively.
107	Bethlehem Landfill	Pennsylvania	NMHC	Flare	CO2 NMHC NOx Oxygen	Test date 10/9/96. Oxygen and CO2, NOx, and NMHC, were determined by EPA Methods 3A, 7E, and 18, respectively.
108	Hartford Landfill	Connecticut	NMOC	Flare	CO CO2 Methane NMOC NOx Oxygen SO2 THC	Test date 11/4/93. Oxygen, NOx, CO, SO2, and THCwere determined by EPA Methods 3A, 7E, 10, 6C, and 25A, respectively. CO2, NMOC and methane were determined by EPA Method 18.
109	Contra Costa Landfill	California	1,1,1-Trichloroethane 1,2-Dichloroethane Benzene Carbon tetrachloride Chloroform CO CO2 Ethylene dibromide Methane Methylene chloride Nitrogen NMOC Oxygen Tetrachlorethene Trichlorethene Vinyl chloride	Gas Flare	1,1,1-Trichloroethane 1,2-Dichloroethane Benzene Carbon tetrachloride Chloroform CO CO2 Ethylene dibromide Methane Methylene chloride Nitrogen NMOC Oxygen Tetrachlorethene Trichlorethene Vinyl chloride	Test date 3/22/94. EPA Method TO-14 was used.

Appendix B

Background Data for Default LPG Constituent Concentrations

The Lotus 1-2-3 (LFBKAPPB.WK3) or the Excel (LFBKAPPB.XLS) Speradsheet was used for the following Appendix B information. Additional information is contained in the Spreadsheet.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
53	Altamont	U	1,1,1-Trichloroethane	0.28	0.34	0.44
53	Altamont	U	1,1,1-Trichloroethane	0.47	0.55	
54	Arbor Hills	U	1,1,1-Trichloroethane	0.15	0.16	0.15
54	Arbor Hills	U	1,1,1-Trichloroethane	0.14	0.14	
54	Arbor Hills	U	1,1,1-Trichloroethane	0.15	0.15	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.0023	0.0024	0.45
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.057	0.059	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.037	0.039	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	1.80	1.88	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.079	0.082	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.058	0.060	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	1.70	1.77	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.058	0.060	
15	Azusa Land Reclamation	U	1,1,1-Trichloroethane	0.057	0.059	
12	BKK Landfill	Y	1,1,1-Trichloroethane	12.00	26.4	30.0
12	BKK Landfill	Y	1,1,1-Trichloroethane	6.50	15.3	
12	BKK Landfill	Y	1,1,1-Trichloroethane	22.00	48.4	
17	Bradley Pit	U	1,1,1-Trichloroethane	2.10	2.60	2.72
17	Bradley Pit	U	1,1,1-Trichloroethane	4.80	7.38	
17	Bradley Pit	U	1,1,1-Trichloroethane	5.70	8.52	
17	Bradley Pit	U	1,1,1-Trichloroethane	0.57	0.71	
17	Bradley Pit	U	1,1,1-Trichloroethane	0.54	0.68	
17	Bradley Pit	U	1,1,1-Trichloroethane	2.10	2.54	
19	Bradley Pit	U	1,1,1-Trichloroethane	0.98	1.29	
19	Bradley Pit	U	1,1,1-Trichloroethane	0.21	0.28	
19	Bradley Pit	U	1,1,1-Trichloroethane	2.20	2.91	
19	Bradley Pit	U	1,1,1-Trichloroethane	2.30	3.04	
41	Bradley Pit	U	1,1,1-Trichloroethane	0.0079	0.011	
6	Bradley Pit	U	1,1,1-Trichloroethane	0.73	0.97	
6	Bradley Pit	U	1,1,1-Trichloroethane	0.16	0.21	
6	Bradley Pit	U	1,1,1-Trichloroethane	0.17	0.23	
7	Calabasas	Y	1,1,1-Trichloroethane	0.33	0.50	2.57
7	Calabasas	Y	1,1,1-Trichloroethane	0.60	1.08	
7	Calabasas	Y	1,1,1-Trichloroethane	3.40	6.14	
13	Carson	U	1,1,1-Trichloroethane	0.025	0.053	0.051
13	Carson	U	1,1,1-Trichloroethane	0.037	0.051	
13	Carson	U	1,1,1-Trichloroethane	0.038	0.051	
43	CBI10	U	1,1,1-Trichloroethane	0.25	0.25	0.25
43	CBI11	U	1,1,1-Trichloroethane	4.20	4.25	4.25
43	CBI13	U	1,1,1-Trichloroethane	0.030	0.036	0.036
43	CBI14	U	1,1,1-Trichloroethane	0.48	0.49	0.49
43	CBI15	U	1,1,1-Trichloroethane	0.030	0.030	0.030
43	CBI16	Y	1,1,1-Trichloroethane	0.60	0.61	0.61
43	CBI17	U	1,1,1-Trichloroethane	0.20	0.20	0.20
43	CBI18	U	1,1,1-Trichloroethane	0.37	0.38	0.38
43	CBI20	U	1,1,1-Trichloroethane	0.40	0.40	0.40
43	CBI21	U	1,1,1-Trichloroethane	0.60	0.60	0.60
43	CBI23	U	1,1,1-Trichloroethane	1.30	1.38	1.38
43	CBI24	Y	1,1,1-Trichloroethane	0.50	0.51	0.51
43	CBI25	U	1,1,1-Trichloroethane	1.24	1.25	1.25
43	CBI27	U	1,1,1-Trichloroethane	0.47	0.47	0.47
43	CBI30	U	1,1,1-Trichloroethane	0.16	0.16	0.16
43	CBI32	U	1,1,1-Trichloroethane	1.35	1.36	1.36
43	CBI4	U	1,1,1-Trichloroethane	0.34	0.36	0.36
43	CBI5	U	1,1,1-Trichloroethane	0.15	0.15	0.15
43	CBI6	U	1,1,1-Trichloroethane	1.15	1.16	1.16
43	CBI8	U	1,1,1-Trichloroethane	0.77	0.78	0.78
43	CBI9	U	1,1,1-Trichloroethane	1.90	1.92	1.92
55	Chicopee	U	1,1,1-Trichloroethane	2.20	2.82	2.82
56	Coyote Canyon	U	1,1,1-Trichloroethane	0.18	0.24	0.25
56	Coyote Canyon	U	1,1,1-Trichloroethane	0.17	0.22	
56	Coyote Canyon	U	1,1,1-Trichloroethane	0.17	0.23	
56	Coyote Canyon	U	1,1,1-Trichloroethane	0.17	0.26	
56	Coyote Canyon	U	1,1,1-Trichloroethane	0.21	0.30	
56	Coyote Canyon	U	1,1,1-Trichloroethane	0.18	0.26	
57	Durham Rd.	U	1,1,1-Trichloroethane	0.67	0.88	1.66
57	Durham Rd.	U	1,1,1-Trichloroethane	0.75	0.90	
57	Durham Rd.	U	1,1,1-Trichloroethane	2.70	3.21	
10	Mission Canyon	N	1,1,1-Trichloroethane	0.016	0.066	0.066
5	Mountaingate	N	1,1,1-Trichloroethane	0.011	0.032	0.032
5	Mountaingate	N	1,1,1-Trichloroethane	0.011	0.032	
5	Mountaingate	N	1,1,1-Trichloroethane	0.012	0.035	
5	Mountaingate	N	1,1,1-Trichloroethane	0.011	0.032	
58	Otay Annex	U	1,1,1-Trichloroethane	0.17	0.18	0.18
58	Otay Landfill	Y	1,1,1-Trichloroethane	0.010	0.014	0.014
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0022	0.010	
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.010	0.044	0.061
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.014	0.061	
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.036	0.16	
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0035	0.015	
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0022	0.010	

Summary Statistics of Site Averages (ppmv) 1,1,1-Trichloroethane	
Mean	1.804
Median	0.480
Standard Deviation	4.820
Variance	23.231
Kurtosis	30.211
Skewness	5.269
Range	30.000
Minimum	0.014
Maximum	30.014
Sum	75.787
Count	42.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0058	0.025			
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0022	0.010			
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0058	0.025			
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0020	0.0087			
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0028	0.012			
22	Palos Verdes	Y	1,1,1-Trichloroethane	0.0042	0.018			
51	Palos Verdes	Y	1,1,1-Trichloroethane	0.056	0.14			
51	Palos Verdes	Y	1,1,1-Trichloroethane	0.10	0.32			
20	Penrose	U	1,1,1-Trichloroethane	0.021	0.027	0.042		
20	Penrose	U	1,1,1-Trichloroethane	0.021	0.027			
20	Penrose	U	1,1,1-Trichloroethane	0.046	0.079			
20	Penrose	U	1,1,1-Trichloroethane	0.045	0.077			
20	Penrose	U	1,1,1-Trichloroethane	0.0087	0.021			
20	Penrose	U	1,1,1-Trichloroethane	0.012	0.028			
20	Penrose	U	1,1,1-Trichloroethane	0.015	0.030			
20	Penrose	U	1,1,1-Trichloroethane	0.023	0.045			
18	Puente Hills	N	1,1,1-Trichloroethane	0.91	1.18	1.47		
18	Puente Hills	N	1,1,1-Trichloroethane	0.94	1.27			
18	Puente Hills	N	1,1,1-Trichloroethane	0.60	0.80			
18	Puente Hills	N	1,1,1-Trichloroethane	0.50	0.66			
24	Puente Hills	N	1,1,1-Trichloroethane	2.20	3.17			
24	Puente Hills	N	1,1,1-Trichloroethane	1.70	2.35			
50	Puente Hills	N	1,1,1-Trichloroethane	0.73	0.88			
59	Rockingham LF	U	1,1,1-Trichloroethane	7.90	10.5	10.5		
1	Scholl Canyon	N	1,1,1-Trichloroethane	0.46	0.74	0.53		
1	Scholl Canyon	N	1,1,1-Trichloroethane	0.14	0.32			
9	Sheldon Street	U	1,1,1-Trichloroethane	8.60	17.12	4.34	1,1,2,2-Tetrachloroethane	
9	Sheldon Street	U	1,1,1-Trichloroethane	0.015	0.030		Mean	1.110
9	Sheldon Street	U	1,1,1-Trichloroethane	0.05	0.11		Median	0.202
9	Sheldon Street	U	1,1,1-Trichloroethane	0.05	0.11		Standard Deviation	1.416
23	Toyon Canyon	N	1,1,1-Trichloroethane	0.61	0.66	0.66	Variance	2.005
43	CBI10	U	1,1,2,2-Tetrachloroethane	3.65	3.72	3.72	Kurtosis	-0.252
43	CBI15	U	1,1,2,2-Tetrachloroethane	0.010	0.010	0.010	Skewness	1.084
43	CBI24	Y	1,1,2,2-Tetrachloroethane	2.00	2.03	2.03	Range	3.711
43	CBI30	U	1,1,2,2-Tetrachloroethane	0.11	0.11	0.11	Minimum	0.010
43	CBI5	U	1,1,2,2-Tetrachloroethane	0.20	0.20	0.20	Maximum	3.721
43	CBI7	U	1,1,2,2-Tetrachloroethane	2.35	2.41	2.41	Sum	8.884
43	CBI9	U	1,1,2,2-Tetrachloroethane	0.20	0.20	0.20	Count	8.000
59	Rockingham	U	1,1,2,2-Tetrachloroethane	0.15	0.20	0.20	Normality Test (p)	<.10
43	CBI11	U	1,1,2-Trichloroethane	0.10	0.10	0.10		
54	Arbor Hills	U	1,1-Dichloroethane	1.59	1.63	1.37		
54	Arbor Hills	U	1,1-Dichloroethane	1.26	1.27			
54	Arbor Hills	U	1,1-Dichloroethane	1.18	1.20			
43	CBI10	U	1,1-Dichloroethane	2.30	2.34	2.34		
43	CBI11	U	1,1-Dichloroethane	19.5	19.7	19.7		
43	CBI12	U	1,1-Dichloroethane	0.85	0.94	0.94	1,1-Dichloroethane	
43	CBI13	U	1,1-Dichloroethane	0.30	0.36	0.36	Mean	5.487
43	CBI14	U	1,1-Dichloroethane	11.9	12.0	12.0	Median	2.345
43	CBI15	U	1,1-Dichloroethane	0.050	0.050	0.050	Standard Deviation	10.747
43	CBI16	Y	1,1-Dichloroethane	0.60	0.61	0.61	Variance	115.508
43	CBI17	U	1,1-Dichloroethane	1.75	1.77	1.77	Kurtosis	20.226
43	CBI18	U	1,1-Dichloroethane	5.63	5.74	5.74	Skewness	4.229
43	CBI2	U	1,1-Dichloroethane	0.10	0.10	0.10	Range	58.050
43	CBI20	U	1,1-Dichloroethane	2.75	2.77	2.77	Minimum	0.050
43	CBI22	U	1,1-Dichloroethane	0.40	0.40	0.40	Maximum	58.100
43	CBI23	U	1,1-Dichloroethane	2.60	2.76	2.76	Sum	170.094
43	CBI24	Y	1,1-Dichloroethane	11.9	12.1	12.1	Count	31.000
43	CBI25	U	1,1-Dichloroethane	1.21	1.22	1.22	Normality Test (p)	<.01
43	CBI26	U	1,1-Dichloroethane	0.45	0.45	0.45		
43	CBI27	U	1,1-Dichloroethane	6.33	6.37	6.37		
43	CBI29	U	1,1-Dichloroethane	3.53	3.73	3.73		
43	CBI3	U	1,1-Dichloroethane	0.10	0.10	0.10		
43	CBI30	U	1,1-Dichloroethane	0.71	0.72	0.72		
43	CBI33	U	1,1-Dichloroethane	0.10	0.10	0.10		
43	CBI4	U	1,1-Dichloroethane	2.35	2.47	2.47		
43	CBI5	U	1,1-Dichloroethane	1.60	1.62	1.62		
43	CBI6	U	1,1-Dichloroethane	4.50	4.53	4.53		
43	CBI8	U	1,1-Dichloroethane	8.95	9.02	9.02		
43	CBI9	U	1,1-Dichloroethane	7.90	7.98	7.98		
55	Chicopee	U	1,1-Dichloroethane	5.02	6.44	6.44		
56	Coyote Canyon	U	1,1-Dichloroethane	2.34	3.24	3.36		
56	Coyote Canyon	U	1,1-Dichloroethane	2.52	3.36			
56	Coyote Canyon	U	1,1-Dichloroethane	3.13	4.17			
56	Coyote Canyon	U	1,1-Dichloroethane	2.87	4.25			
56	Coyote Canyon	U	1,1-Dichloroethane	1.80	2.62			
56	Coyote Canyon	U	1,1-Dichloroethane	1.70	2.51			
27	Lyon Development	U	1,1-dichloroethane	1.10	1.29	0.90		
27	Lyon Development	U	1,1-dichloroethane	3.00	3.57			
27	Lyon Development	U	1,1-dichloroethane	0.060	0.059			
27	Lyon Development	U	1,1-dichloroethane	0.19	0.22			
27	Lyon Development	U	1,1-dichloroethane	0.15	0.18			

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
27	Lyon Development	U	1,1-dichloroethane	0.060	0.059			
59	Rockingham LF	U	1,1-Dichloroethane	43.7	58.1	58.1		
3	Altamont	U	1,2-Dichloroethane	0.55	0.66	0.41		
3	Altamont	U	1,2-Dichloroethane	0.13	0.15			
54	Arbor Hills	U	1,2-Dichloroethane	0.27	0.28	0.39		
54	Arbor Hills	U	1,2-Dichloroethane	0.34	0.34			
54	Arbor Hills	U	1,2-Dichloroethane	0.54	0.55		1,2-Dichloroethane	
15	Azusa Land Reclamation	U	1,2-Dichloroethane	0.15	0.16	0.16	Mean	5.864
15	Azusa Land Reclamation	U	1,2-Dichloroethane	0.15	0.16		Median	0.407
12	BKK Landfill	Y	1,2-Dichloroethane	50.0	110	66.8	Standard Deviation	15.390
12	BKK Landfill	Y	1,2-Dichloroethane	10.0	23.5		Variance	236.858
17	Bradley Pit	U	1,2-Dichloroethane	1.80	2.69	2.20	Kurtosis	10.104
17	Bradley Pit	U	1,2-Dichloroethane	4.30	5.38		Skewness	3.176
17	Bradley Pit	U	1,2-Dichloroethane	4.30	5.38		Range	66.783
17	Bradley Pit	U	1,2-Dichloroethane	2.20	2.66		Minimum	0.020
17	Bradley Pit	U	1,2-Dichloroethane	2.20	2.72		Maximum	66.803
17	Bradley Pit	U	1,2-Dichloroethane	1.80	2.77		Sum	158.317
19	Bradley Pit	U	1,2-Dichloroethane	1.60	2.06		Count	27.000
19	Bradley Pit	U	1,2-Dichloroethane	1.10	1.40		Normality Test (p)	<.01
19	Bradley Pit	U	1,2-Dichloroethane	0.15	0.23			
19	Bradley Pit	U	1,2-Dichloroethane	1.30	1.61			
6	Bradley Pit	U	1,2-Dichloroethane	0.43	0.54			
6	Bradley Pit	U	1,2-Dichloroethane	0.43	0.59			
6	Bradley Pit	U	1,2-Dichloroethane	0.43	0.58			
7	Calabasas	Y	1,2-Dichloroethane	15.0	27.1	29.8		
7	Calabasas	Y	1,2-Dichloroethane	18.0	32.5			
43	CBI10	U	1,2-Dichloroethane	1.80	1.83	1.83		
43	CBI11	U	1,2-Dichloroethane	0.45	0.46	0.46		
43	CBI12	U	1,2-Dichloroethane	0.55	0.61	0.61		
43	CBI13	U	1,2-Dichloroethane	0.020	0.024	0.024		
43	CBI14	U	1,2-Dichloroethane	0.020	0.020	0.020		
43	CBI19	U	1,2-Dichloroethane	0.50	0.50	0.50		
43	CBI21	U	1,2-Dichloroethane	0.78	0.79	0.79		
43	CBI31	U	1,2-Dichloroethane	1.90	1.90	1.90		
43	CBI8	U	1,2-Dichloroethane	0.18	0.18	0.18		
43	CBI9	U	1,2-Dichloroethane	0.10	0.10	0.10		
55	Chicopee	U	1,2-Dichloroethane	0.11	0.14	0.14		
56	Coyote Canyon	U	1,2-Dichloroethane	0.12	0.15	0.21		
56	Coyote Canyon	U	1,2-Dichloroethane	0.13	0.17			
56	Coyote Canyon	U	1,2-Dichloroethane	0.23	0.30			
56	Coyote Canyon	U	1,2-Dichloroethane	0.23	0.34			
56	Coyote Canyon	U	1,2-Dichloroethane	0.11	0.16			
56	Coyote Canyon	U	1,2-Dichloroethane	0.10	0.14			
57	Durham Rd.	U	1,2-Dichloroethane	0.12	0.16	0.16		
57	Durham Rd.	U	1,2-Dichloroethane	0.13	0.16			
57	Durham Rd.	U	1,2-Dichloroethane	0.14	0.17			
27	Lyon Development	U	1,2-Dichloroethane	0.060	0.071	0.067		
27	Lyon Development	U	1,2-Dichloroethane	0.060	0.071			
27	Lyon Development	U	1,2-Dichloroethane	0.060	0.060			
5	Mountaingate	N	1,2-Dichloroethane	0.06	0.17	0.17		
5	Mountaingate	N	1,2-Dichloroethane	0.06	0.17			
5	Mountaingate	N	1,2-Dichloroethane	0.06	0.17			
5	Mountaingate	N	1,2-Dichloroethane	0.06	0.17			
58	Otay Annex	U	1,2-Dichloroethane	0.025	0.027	0.027		
84	Otay Landfill	Y	1,2-Dichloroethane	0.025	0.034	0.034		
22	Palos Verdes	Y	1,2-Dichloroethane	0.08	0.35	1.78		
22	Palos Verdes	Y	1,2-Dichloroethane	0.08	0.35			
22	Palos Verdes	Y	1,2-Dichloroethane	0.08	0.35			
22	Palos Verdes	Y	1,2-Dichloroethane	0.08	0.35			
22	Palos Verdes	Y	1,2-Dichloroethane	0.08	0.35			
22	Palos Verdes	Y	1,2-Dichloroethane	0.08	0.35			
22	Palos Verdes	Y	1,2-Dichloroethane	1.10	4.80			
22	Palos Verdes	Y	1,2-Dichloroethane	0.15	0.65			
22	Palos Verdes	Y	1,2-Dichloroethane	0.15	0.65			
22	Palos Verdes	Y	1,2-Dichloroethane	1.10	4.80			
22	Palos Verdes	Y	1,2-Dichloroethane	1.10	4.80			
22	Palos Verdes	Y	1,2-Dichloroethane	0.81	3.53			
20	Penrose	U	1,2-Dichloroethane	0.50	0.64	0.92		
20	Penrose	U	1,2-Dichloroethane	0.50	0.63			
20	Penrose	U	1,2-Dichloroethane	0.50	0.86			
20	Penrose	U	1,2-Dichloroethane	0.50	0.85			
20	Penrose	U	1,2-Dichloroethane	0.50	1.22			
20	Penrose	U	1,2-Dichloroethane	0.50	1.18			
20	Penrose	U	1,2-Dichloroethane	0.50	0.99		1,2-Dichloropropane	
20	Penrose	U	1,2-Dichloroethane	0.50	0.97		Mean	0.392
18	Puente Hills	N	1,2-Dichloroethane	6.00	7.79	7.96	Median	0.171
18	Puente Hills	N	1,2-Dichloroethane	6.00	8.09		Standard Deviation	0.597
18	Puente Hills	N	1,2-Dichloroethane	6.00	8.00		Variance	0.356
18	Puente Hills	N	1,2-Dichloroethane	6.00	7.95		Kurtosis	6.445
59	Rockingham	U	1,2-Dichloroethane	30.6	40.7	40.7	Skewness	2.488

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
43	CBI11	U	1,2-Dichloropropane	1.80	1.82	1.82	Range	1.800
43	CBI13	U	1,2-Dichloropropane	0.06	0.07	0.07	Minimum	0.020
43	CBI14	U	1,2-Dichloropropane	0.02	0.02	0.02	Maximum	1.820
43	CBI24	Y	1,2-Dichloropropane	0.50	0.51	0.51	Sum	3.136
43	CBI27	U	1,2-Dichloropropane	0.27	0.27	0.27	Count	8.000
43	CBI30	U	1,2-Dichloropropane	0.22	0.22	0.22	Normality Test (p)	<.05
43	CBI5	U	1,2-Dichloropropane	0.10	0.10	0.10	Geometric Mean	0.178
43	CBI8	U	1,2-Dichloropropane	0.12	0.12	0.12		
41	Guadalupe	U	1,2-Dimethyl cyclohexane	8.80	10.5	10.5		
41	Guadalupe	U	1,3-Dimethyl cyclohexane	5.40	6.47	6.47		
41	Guadalupe	U	1,3-Dimethyl cyclopentane	21.4	25.6	25.6	2-Propanol	
41	Guadalupe	U	1-Butanol	8.20	9.82	9.82	Mean	50.060
41	Guadalupe	U	1-Propanol	3.20	3.83	3.83	Median	50.060
41	Guadalupe	U	2,4-Dimethyl heptane	10.5	12.6	12.6	Standard Deviation	20.663
41	Guadalupe	U	2-Butanol	13.3	15.9	15.9	Variance	426.950
43	CBI15	U	2-Chloroethylvinyl ether	2.25	2.27	2.27	Kurtosis	N/A
41	Guadalupe	U	2-Hexanone	12.6	15.1	15.1	Skewness	N/A
41	Guadalupe	U	2-Methyl heptane	2.10	2.51	2.51	Range	29.222
41	Guadalupe	U	2-Methyl propane	4.40	5.27	5.27	Minimum	35.449
41	Guadalupe	U	2-Methyl-methylester propanoic acid	5.60	6.71	6.71	Maximum	64.671
41	Guadalupe	U	2-Propanol	5.20	6.23	35.4	Sum	100.120
60	Sunshine Canyon	U	2-Propanol	54.0	64.7	64.7	Count	2.000
41	Guadalupe	U	3-Carene	44.1	63.7	63.7		
43	CBI11	U	Acetone	12.0	12.1	12.1	Acetone	
43	CBI12	U	Acetone	2.25	2.48	2.48	Mean	11.001
43	CBI14	U	Acetone	1.84	1.86	1.86	Median	7.014
43	CBI18	U	Acetone	4.50	4.59	4.59	Standard Deviation	12.202
43	CBI20	U	Acetone	6.50	6.54	6.54	Variance	148.897
43	CBI21	U	Acetone	2.25	2.27	2.27	Kurtosis	4.650
43	CBI22	U	Acetone	19.3	19.5	19.5	Skewness	2.106
43	CBI23	U	Acetone	1.00	1.06	1.06	Range	47.874
43	CBI24	Y	Acetone	20.0	20.3	20.3	Minimum	1.062
43	CBI26	U	Acetone	8.50	8.54	8.54	Maximum	48.936
43	CBI27	U	Acetone	5.33	5.37	5.37	Sum	209.024
43	CBI3	U	Acetone	3.40	3.41	3.41	Count	19.000
43	CBI31	U	Acetone	7.00	7.01	7.01	Normality Test (p)	<.01
43	CBI32	U	Acetone	2.50	2.51	2.51		
43	CBI33	U	Acetone	8.00	8.02	8.02	Acrylonitrile	
43	CBI6	U	Acetone	7.50	7.55	7.55	Mean	11.487
43	CBI7	U	Acetone	32.0	32.8	32.8	Median	8.420
43	CBI9	U	Acetone	14.0	14.1	14.1	Standard Deviation	11.795
59	Rockingham	U	Acetone	36.8	48.9	48.9	Variance	139.113
56	Coyote Canyon	U	Acetonitrile	0.023	0.023	0.021	Kurtosis	2.550
56	Coyote Canyon	U	Acetonitrile	0.019	0.019		Skewness	1.406
43	CBI14	U	Acrylonitrile	0.80	0.81	0.81	Range	27.490
43	CBI25	U	Acrylonitrile	7.40	7.46	7.46	Minimum	0.810
43	CBI4	U	Acrylonitrile	8.93	9.38	9.38	Maximum	28.300
59	Rockingham	U	Acrylonitrile	21.3	28.3	28.3	Sum	45.950
53	Altamont	U	Benzene	3.70	4.46	2.76	Count	4.000
53	Altamont	U	Benzene	0.91	1.06		Normality Test (p)	<.15
54	Arbor Hills	U	Benzene	0.95	0.98	0.95	Geometric Mean	6.33
54	Arbor Hills	U	Benzene	0.99	1.00			
54	Arbor Hills	U	Benzene	0.84	0.86			
15	Azusa Land Reclamation	U	Benzene	0.10	0.10	2.00		
15	Azusa Land Reclamation	U	Benzene	0.10	0.10			
15	Azusa Land Reclamation	U	Benzene	1.90	1.98			
15	Azusa Land Reclamation	U	Benzene	2.00	2.09			
15	Azusa Land Reclamation	U	Benzene	2.30	2.40			
15	Azusa Land Reclamation	U	Benzene	2.80	2.92			
15	Azusa Land Reclamation	U	Benzene	1.80	1.88			
15	Azusa Land Reclamation	U	Benzene	2.20	2.29			
15	Azusa Land Reclamation	U	Benzene	4.10	4.28			
12	BKK Landfill	Y	Benzene	45.0	99.1	92.6		
12	BKK Landfill	Y	Benzene	34.0	79.8			
12	BKK Landfill	Y	Benzene	45.0	98.9			
17	Bradley Pit	U	Benzene	2.80	3.47	2.99		
17	Bradley Pit	U	Benzene	3.10	3.74			
17	Bradley Pit	U	Benzene	2.30	3.54			
17	Bradley Pit	U	Benzene	1.10	1.38			
17	Bradley Pit	U	Benzene	2.60	3.89			
17	Bradley Pit	U	Benzene	1.10	1.38			
41	Bradley Pit	U	Benzene	0.90	1.30			
0	Bradley Pit	U	Benzene	1.70	2.31			
6	Bradley Pit	U	Benzene	6.10	7.63			
6	Bradley Pit	U	Benzene	0.90	1.23		Benzene (co-disposal only)	
7	Calabasas	Y	Benzene	18.0	32.5		Mean	30.020
7	Calabasas	Y	Benzene	32.0	57.8		Median	22.598
7	Calabasas	Y	Benzene	11.7	17.8	36.0	Standard Deviation	34.374
13	Carson	U	Benzene	4.20	6.46	6.67	Variance	1181.558
13	Carson	U	Benzene	3.70	5.69		Kurtosis	2.110
13	Carson	U	Benzene	5.10	7.85		Skewness	1.447

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Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
43	CBI10	U	Benzene	1.00	1.02	1.02	Range	92.306
43	CBI11	U	Benzene	1.95	1.97	1.97	Minimum	0.305
43	CBI12	U	Benzene	2.60	2.86	2.86	Maximum	92.611
43	CBI13	U	Benzene	1.53	1.85	1.85	Sum	180.121
43	CBI14	U	Benzene	2.76	2.79	2.79	Count	6.000
43	CBI15	U	Benzene	0.35	0.35	0.35	Normality Test (p)	>.20
43	CBI16	Y	Benzene	0.30	0.30	0.30	Geometric Mean	11.133
43	CBI17	U	Benzene	0.10	0.10	0.10		
43	CBI18	U	Benzene	1.53	1.56	1.56		
43	CBI20	U	Benzene	0.65	0.65	0.65		
43	CBI21	U	Benzene	1.05	1.06	1.06		
43	CBI22	U	Benzene	0.57	0.58	0.58		
43	CBI23	U	Benzene	1.20	1.27	1.27		
43	CBI24	Y	Benzene	5.53	5.61	5.61	Benzene (unknown & no co-disp.)	
43	CBI25	U	Benzene	2.42	2.44	2.44	Mean	4.299
43	CBI26	U	Benzene	0.15	0.15	0.15	Median	1.911
43	CBI27	U	Benzene	0.77	0.78	0.78	Standard Deviation	12.251
43	CBI29	U	Benzene	79.1	83.7	83.7	Variance	150.080
43	CBI30	U	Benzene	2.65	2.67	2.67	Kurtosis	41.515
43	CBI31	U	Benzene	0.60	0.60	0.60	Skewness	6.317
43	CBI32	U	Benzene	0.70	0.70	0.70	Range	83.553
43	CBI33	U	Benzene	0.83	0.83	0.83	Minimum	0.101
43	CBI4	U	Benzene	1.04	1.09	1.09	Maximum	83.654
43	CBI5	U	Benzene	2.55	2.58	2.58	Sum	197.736
43	CBI6	U	Benzene	0.20	0.20	0.20	Count	46.000
43	CBI7	U	Benzene	1.50	1.54	1.54	Normality Test (p)	<.01
43	CBI8	U	Benzene	4.55	4.59	4.59		
43	CBI9	U	Benzene	1.00	1.01	1.01		
55	Chicopee	U	Benzene	4.82	6.19	6.19		
56	Coyote Canyon	U	Benzene	1.64	2.18	2.37		
56	Coyote Canyon	U	Benzene	1.73	2.56			
57	Durham Rd.	U	Benzene	2.30	3.03	3.20		
57	Durham Rd.	U	Benzene	2.40	2.89			
57	Durham Rd.	U	Benzene	3.10	3.69			
27	Lyon Development	U	Benzene	0.55	0.65	0.79		
27	Lyon Development	U	Benzene	1.20	1.43			
27	Lyon Development	U	Benzene	0.31	0.31			
10	Mission Canyon	N	Benzene	0.036	0.15	1.36		
5	Mountaingate	N	Benzene	0.13	0.37	0.30		
5	Mountaingate	N	Benzene	0.09	0.26			
5	Mountaingate	N	Benzene	0.10	0.29			
5	Mountaingate	N	Benzene	0.10	0.29			
8	Operating Industries	U	Benzene	4.70	9.36	9.36		
58	Otay Annex	U	Benzene	3.36	4.57	4.57		
84	Otay Landfill	Y	Benzene	8.48	9.17	9.17		
22	Palos Verdes	Y	Benzene	13.0	56.7	36.4		
22	Palos Verdes	Y	Benzene	2.50	10.9			
22	Palos Verdes	Y	Benzene	20.0	87.2			
22	Palos Verdes	Y	Benzene	1.00	4.36			
22	Palos Verdes	Y	Benzene	2.30	10.0			
22	Palos Verdes	Y	Benzene	5.40	23.5			
22	Palos Verdes	Y	Benzene	0.96	4.19			
22	Palos Verdes	Y	Benzene	6.00	26.2			
22	Palos Verdes	Y	Benzene	20.0	87.2			
22	Palos Verdes	Y	Benzene	5.40	23.5			
22	Palos Verdes	Y	Benzene	0.96	4.19			
22	Palos Verdes	Y	Benzene	1.10	4.80			
51	Palos Verdes	Y	Benzene	9.80	31.2			
51	Palos Verdes	Y	Benzene	53.0	136			
20	Penrose	U	Benzene	1.90	2.43	3.84		
20	Penrose	U	Benzene	2.20	2.78			
20	Penrose	U	Benzene	4.00	6.88			
20	Penrose	U	Benzene	4.00	6.81			
20	Penrose	U	Benzene	1.40	3.41			
20	Penrose	U	Benzene	1.40	3.31			
20	Penrose	U	Benzene	1.30	2.58			
20	Penrose	U	Benzene	1.30	2.53			
18	Puente Hills	N	Benzene	12.0	15.6	14.5		
18	Puente Hills	N	Benzene	12.0	16.2			
18	Puente Hills	N	Benzene	16.0	21.3			
18	Puente Hills	N	Benzene	15.0	19.9			
24	Puente Hills	N	Benzene	6.60	9.52			
24	Puente Hills	N	Benzene	6.25	8.66			
50	Puente Hills	N	Benzene	8.50	10.30			
59	Rockingham	U	Benzene	1.30	1.73	1.73		
1	Scholl Canyon	N	Benzene	3.90	6.26	3.45		
1	Scholl Canyon	N	Benzene	0.28	0.64			
9	Sheldon Street	U	Benzene	0.50	1.00	6.53		
9	Sheldon Street	U	Benzene	0.50	1.00			
9	Sheldon Street	U	Benzene	0.13	0.26			
9	Sheldon Street	U	Benzene	12.0	23.9			

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
39	Sunshine Canyon	U	Benzene	2.20	2.32	2.32
23	Toyon Canyon	N	Benzene	2.75	2.96	2.96
43	CBI13	U	Bromodichloromethane	0.22	0.27	0.27
43	CBI14	U	Bromodichloromethane	0.12	0.12	0.12
43	CBI24	Y	Bromodichloromethane	2.48	2.52	2.52
43	CBI25	U	Bromodichloromethane	7.85	7.91	7.91
43	CBI30	U	Bromodichloromethane	2.02	2.04	2.04
43	CBI4	U	Bromodichloromethane	1.14	1.20	1.20
43	CBI8	U	Bromodichloromethane	7.80	7.86	7.86
43	CBI11	U	Butane	16.5	16.7	16.7
43	CBI14	U	Butane	18.8	19.0	19.0
43	CBI16	Y	Butane	1.00	1.02	1.02
43	CBI17	U	Butane	1.00	1.01	1.01
43	CBI18	U	Butane	0.83	0.85	0.85
43	CBI19	U	Butane	2.50	2.51	2.51
43	CBI26	U	Butane	1.50	1.51	1.51
43	CBI27	U	Butane	6.07	6.11	6.11
43	CBI32	U	Butane	5.00	5.03	5.03
43	CBI33	U	Butane	1.13	1.13	1.13
43	CBI34	U	Butane	0.50	0.50	0.50
43	CBI5	U	Butane	11.8	11.9	11.9
43	CBI6	U	Butane	9.50	9.57	9.57
43	CBI9	U	Butane	32.0	32.3	32.3
60	Sunshine Canyon	U	Butane	38.0	40.0	40.0
41	Guadalupe	U	Butylester butanoic acid	11.6	16.8	16.8
54	Arbor Hills	U	Carbon disulfide	0.092	0.094	0.094
54	Arbor Hills	U	Carbon disulfide	0.093	0.095	
15	Azusa Land Reclamation	U	Carbon disulfide	0.41	0.43	0.43
12	BKK Landfill	Y	Carbon disulfide	0.83	1.86	1.20
12	BKK Landfill	Y	Carbon disulfide	0.66	1.46	
12	BKK Landfill	Y	Carbon disulfide	0.40	0.86	
12	BKK Landfill	Y	Carbon disulfide	0.50	1.08	
12	BKK Landfill	Y	Carbon disulfide	0.50	1.06	
12	BKK Landfill	Y	Carbon disulfide	0.50	1.45	
12	BKK Landfill	Y	Carbon disulfide	0.50	1.09	
12	BKK Landfill	Y	Carbon disulfide	0.60	1.28	
12	BKK Landfill	Y	Carbon disulfide	0.30	0.67	
6	Bradley Pit	U	Carbon disulfide	1.20	1.64	1.64
7	Calabasas	Y	Carbon disulfide	0.050	0.076	0.076
56	Coyote Canyon	U	Carbon disulfide	0.070	0.10	0.10
24	Puente Hills	N	Carbon disulfide	0.90	1.31	1.01
24	Puente Hills	N	Carbon disulfide	0.81	1.16	
24	Puente Hills	N	Carbon disulfide	0.85	1.18	
24	Puente Hills	N	Carbon disulfide	1.00	1.38	
50	Puente Hills	N	Carbon disulfide	0.00005	0.00006	
1	Scholl Canyon	N	Carbon disulfide	0.050	0.11	0.11
10	Mission Canyon	N	Carbon tetrachloride	0.00040	0.0016	0.0016
5	Mountaingate	N	Carbon tetrachloride	0.00036	0.0010	0.00083
5	Mountaingate	N	Carbon tetrachloride	0.00026	0.00075	
5	Mountaingate	N	Carbon tetrachloride	0.00026	0.00075	
5	Mountaingate	N	Carbon tetrachloride	0.00027	0.00078	
18	Puente Hills	N	Carbon tetrachloride	0.030	0.039	0.024
18	Puente Hills	N	Carbon tetrachloride	0.030	0.040	
18	Puente Hills	N	Carbon tetrachloride	0.030	0.040	
18	Puente Hills	N	Carbon tetrachloride	0.030	0.040	
24	Puente Hills	N	Carbon tetrachloride	0.0014	0.0019	
24	Puente Hills	N	Carbon tetrachloride	0.0012	0.0017	
50	Puente Hills	N	Carbon tetrachloride	0.0050	0.0061	
1	Scholl Canyon	N	Carbon tetrachloride	0.18	0.41	0.41
23	Toyon Canyon	N	Carbon tetrachloride	0.0025	0.0027	0.0027
53	Altamont	U	Carbon tetrachloride	0.0025	0.0030	0.0030
53	Altamont	U	Carbon tetrachloride	0.0025	0.0029	
54	Arbor Hills	U	Carbon tetrachloride	0.0025	0.0026	0.0025
54	Arbor Hills	U	Carbon tetrachloride	0.0025	0.0025	
54	Arbor Hills	U	Carbon tetrachloride	0.0025	0.0025	
15	Azusa Land Reclamation	U	Carbon tetrachloride	0.0014	0.0015	0.0015
15	Azusa Land Reclamation	U	Carbon tetrachloride	0.0014	0.0015	
19	Bradley Pit	U	Carbon tetrachloride	0.0015	0.0019	0.0023
19	Bradley Pit	U	Carbon tetrachloride	0.0015	0.0019	
19	Bradley Pit	U	Carbon tetrachloride	0.0015	0.0023	
19	Bradley Pit	U	Carbon tetrachloride	0.0015	0.0019	
6	Bradley Pit	U	Carbon tetrachloride	0.0001	0.0001	
6	Bradley Pit	U	Carbon tetrachloride	0.0010	0.0014	
6	Bradley Pit	U	Carbon tetrachloride	0.0030	0.0041	
6	Bradley Pit	U	Carbon tetrachloride	0.0040	0.0050	
13	Carson	U	Carbon tetrachloride	0.00064	0.00086	0.047
13	Carson	U	Carbon tetrachloride	0.10	0.14	
13	Carson	U	Carbon tetrachloride	0.00080	0.0017	
43	CBI15	U	Carbon tetrachloride	0.050	0.050	0.050
55	Chicopee	U	Carbon tetrachloride	0.070	0.090	0.0899
56	Coyote Canyon	U	Carbon tetrachloride	0.0005	0.0007	0.0026

Summary Statistics of Site Averages (ppmv)

Bromodichloromethane	
Mean	3.131
Median	2.038
Standard Deviation	3.362
Variance	11.306
Kurtosis	-1.058
Skewness	0.956
Range	7.792
Minimum	0.121
Maximum	7.913
Sum	21.918
Count	7.000
Normality Test (p)	<.10

Butane	
Mean	9.941
Median	5.025
Standard Deviation	12.276
Variance	150.697
Kurtosis	1.644
Skewness	1.539
Range	39.499
Minimum	0.501
Maximum	40.000
Sum	149.111
Count	15.000
Normality Test (p)	<.05

Carbon disulfide	
Mean	0.583
Median	0.271
Standard Deviation	0.616
Variance	0.380
Kurtosis	-0.931
Skewness	0.846
Range	1.568
Minimum	0.076
Maximum	1.644
Sum	4.664
Count	8.000
Normality Test (p)	>.20

Carbon tetrachloride	
Mean	0.053
Median	0.004
Standard Deviation	0.102
Variance	0.010
Kurtosis	7.099
Skewness	2.631
Range	0.410
Minimum	0.000
Maximum	0.410
Sum	1.161
Count	22.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
56	Coyote Canyon	U	Carbon tetrachloride	0.0005	0.0007	
56	Coyote Canyon	U	Carbon tetrachloride	0.0025	0.0033	
56	Coyote Canyon	U	Carbon tetrachloride	0.0025	0.0037	
56	Coyote Canyon	U	Carbon tetrachloride	0.0025	0.0036	
56	Coyote Canyon	U	Carbon tetrachloride	0.0025	0.0037	
57	Durham Rd.	U	Carbon tetrachloride	0.0025	0.0030	0.0030
57	Durham Rd.	U	Carbon tetrachloride	0.0025	0.0030	
57	Durham Rd.	U	Carbon tetrachloride	0.0025	0.0030	
27	Lyon Development	U	Carbon tetrachloride	0.040	0.047	0.045
27	Lyon Development	U	Carbon tetrachloride	0.040	0.048	
27	Lyon Development	U	Carbon tetrachloride	0.040	0.040	
58	Otay Annex	U	Carbon tetrachloride	0.00020	0.00027	0.00027
20	Penrose	U	Carbon tetrachloride	0.0025	0.0032	0.0053
20	Penrose	U	Carbon tetrachloride	0.0025	0.0032	
20	Penrose	U	Carbon tetrachloride	0.0025	0.0043	
20	Penrose	U	Carbon tetrachloride	0.0025	0.0043	
20	Penrose	U	Carbon tetrachloride	0.0025	0.0061	
20	Penrose	U	Carbon tetrachloride	0.0025	0.0059	
20	Penrose	U	Carbon tetrachloride	0.0040	0.0080	
20	Penrose	U	Carbon tetrachloride	0.0040	0.0078	
59	Rockingham	U	Carbon tetrachloride	0.15	0.20	
9	Sheldon Street	U	Carbon tetrachloride	0.0006	0.0012	0.21
9	Sheldon Street	U	Carbon tetrachloride	0.4100	0.8161	
9	Sheldon Street	U	Carbon tetrachloride	0.0015	0.0030	
9	Sheldon Street	U	Carbon tetrachloride	0.00030	0.00060	
12	BKK Landfill	Y	Carbon tetrachloride	0.11	0.24	0.23
12	BKK Landfill	Y	Carbon tetrachloride	0.094	0.22	
12	BKK Landfill	Y	Carbon tetrachloride	0.10	0.22	
7	Calabasas	Y	Carbon tetrachloride	0.020	0.030	0.031
7	Calabasas	Y	Carbon tetrachloride	0.015	0.027	
7	Calabasas	Y	Carbon tetrachloride	0.020	0.036	
84	Otay Landfill	Y	Carbon tetrachloride	0.00020	0.00022	0.00022
22	Palos Verdes	Y	Carbon tetrachloride	0.00024	0.0010	0.0053
22	Palos Verdes	Y	Carbon tetrachloride	0.000080	0.00035	
22	Palos Verdes	Y	Carbon tetrachloride	0.00046	0.0020	
22	Palos Verdes	Y	Carbon tetrachloride	0.00034	0.0015	
22	Palos Verdes	Y	Carbon tetrachloride	0.00015	0.00065	
22	Palos Verdes	Y	Carbon tetrachloride	0.00015	0.00065	
22	Palos Verdes	Y	Carbon tetrachloride	0.0012	0.0052	
22	Palos Verdes	Y	Carbon tetrachloride	0.00012	0.00052	
22	Palos Verdes	Y	Carbon tetrachloride	0.00012	0.00052	
22	Palos Verdes	Y	Carbon tetrachloride	0.00034	0.0015	
22	Palos Verdes	Y	Carbon tetrachloride	0.00026	0.0011	
22	Palos Verdes	Y	Carbon tetrachloride	0.00050	0.0022	
51	Palos Verdes	Y	Carbon tetrachloride	0.010	0.032	
51	Palos Verdes	Y	Carbon tetrachloride	0.010	0.026	
54	Arbor Hills	U	Carbonyl sulfide	0.054	0.055	0.057
54	Arbor Hills	U	Carbonyl sulfide	0.058	0.059	
15	Azusa Land Reclamation	U	Carbonyl sulfide	23.0	24.0	24.0
12	BKK Landfill	Y	Carbonyl sulfide	1.40	3.14	1.64
12	BKK Landfill	Y	Carbonyl sulfide	1.40	3.09	
12	BKK Landfill	Y	Carbonyl sulfide	0.80	1.72	
12	BKK Landfill	Y	Carbonyl sulfide	0.90	1.91	
12	BKK Landfill	Y	Carbonyl sulfide	0.25	0.54	
12	BKK Landfill	Y	Carbonyl sulfide	0.25	0.54	
12	BKK Landfill	Y	Carbonyl sulfide	0.25	0.56	
7	Calabasas	Y	Carbonyl sulfide	0.05	0.08	0.08
24	Puente Hills	N	Carbonyl sulfide	0.57	0.83	0.87
24	Puente Hills	N	Carbonyl sulfide	0.81	1.16	
24	Puente Hills	N	Carbonyl sulfide	0.49	0.68	
24	Puente Hills	N	Carbonyl sulfide	1.20	1.66	
50	Puente Hills	N	Carbonyl sulfide	0.00005	0.00006	
1	Scholl Canyon	N	Carbonyl sulfide	0.050	0.11	0.11
54	Arbor Hills	U	Chlorobenzene	0.71	0.72	0.60
54	Arbor Hills	U	Chlorobenzene	0.74	0.74	
54	Arbor Hills	U	Chlorobenzene	0.70	0.72	
43	CBI12	U	Chlorobenzene	0.20	0.22	0.22
43	CBI13	U	Chlorobenzene	0.15	0.18	0.18
43	CBI15	U	Chlorobenzene	0.05	0.05	0.05
43	CBI22	U	Chlorobenzene	0.10	0.10	0.10
43	CBI24	Y	Chlorobenzene	10.0	10.2	10.2
43	CBI29	U	Chlorobenzene	9.10	9.63	9.63
43	CBI3	U	Chlorobenzene	0.20	0.20	0.20
43	CBI30	U	Chlorobenzene	0.43	0.43	0.43
43	CBI5	U	Chlorobenzene	7.15	7.22	7.22
55	Chicopee	U	Chlorobenzene	0.10	0.13	0.13
56	Coyote Canyon	U	Chlorobenzene	0.010	0.013	0.24
56	Coyote Canyon	U	Chlorobenzene	0.010	0.013	
56	Coyote Canyon	U	Chlorobenzene	0.010	0.015	
56	Coyote Canyon	U	Chlorobenzene	0.010	0.015	
56	Coyote Canyon	U	Chlorobenzene	0.50	0.74	

Summary Statistics of Site Averages (ppmv)

Carbonyl sulfide	
Mean	4.457
Median	0.490
Standard Deviation	9.589
Variance	91.940
Kurtosis	5.910
Skewness	2.426
Range	23.931
Minimum	0.057
Maximum	23.988
Sum	26.745
Count	6.000
Normality Test (p)	<.01

Chlorobenzene	
Mean	2.151
Median	0.254
Standard Deviation	3.767
Variance	14.191
Kurtosis	1.039
Skewness	1.657
Range	10.103
Minimum	0.050
Maximum	10.153
Sum	30.108
Count	14.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
56	Coyote Canyon	U	Chlorobenzene	0.44	0.65	
27	Lyon Development	U	Chlorobenzene	0.20	0.24	0.68
27	Lyon Development	U	Chlorobenzene	0.27	0.32	
27	Lyon Development	U	Chlorobenzene	1.50	1.49	
59	Rockingham	U	Chlorobenzene	0.20	0.27	0.27
43	CBI6	U	Chlorodiflouromethane	0.25	0.25	0.25
43	CBI13	U	Chlorodifluoromethane	0.97	1.17	1.17
43	CBI14	U	Chlorodifluoromethane	12.6	12.7	12.7
43	CBI17	U	Chlorodifluoromethane	3.85	3.89	3.89
43	CBI18	U	Chlorodifluoromethane	0.77	0.79	0.79
43	CBI19	U	Chlorodifluoromethane	1.20	1.20	1.20
43	CBI2	U	Chlorodifluoromethane	0.10	0.10	0.10
43	CBI26	U	Chlorodifluoromethane	1.90	1.91	1.91
43	CBI30	U	Chlorodifluoromethane	1.33	1.34	1.34
43	CBI31	U	Chlorodifluoromethane	1.00	1.00	1.00
43	CBI32	U	Chlorodifluoromethane	3.00	3.02	3.02
43	CBI34	U	Chlorodifluoromethane	0.60	0.60	0.60
43	CBI8	U	Chlorodifluoromethane	4.79	4.83	4.83
43	CBI11	U	Chloroethane	1.35	1.37	1.37
43	CBI12	U	Chloroethane	0.20	0.22	0.22
43	CBI13	U	Chloroethane	0.43	0.52	0.52
43	CBI14	U	Chloroethane	3.25	3.29	3.29
43	CBI15	U	Chloroethane	0.50	0.50	0.50
43	CBI17	U	Chloroethane	1.60	1.62	1.62
43	CBI18	U	Chloroethane	2.33	2.38	2.38
43	CBI19	U	Chloroethane	0.60	0.60	0.60
43	CBI20	U	Chloroethane	1.45	1.46	1.46
43	CBI21	U	Chloroethane	9.20	9.27	9.27
43	CBI23	U	Chloroethane	4.90	5.20	5.20
43	CBI25	U	Chloroethane	0.76	0.77	0.77
43	CBI27	U	Chloroethane	7.33	7.38	7.38
43	CBI3	U	Chloroethane	0.70	0.70	0.70
43	CBI30	U	Chloroethane	0.11	0.11	0.11
43	CBI32	U	Chloroethane	8.25	8.29	8.29
43	CBI33	U	Chloroethane	4.43	4.44	4.44
43	CBI34	U	Chloroethane	0.30	0.30	0.30
43	CBI4	U	Chloroethane	0.17	0.18	0.18
43	CBI5	U	Chloroethane	1.45	1.46	1.46
43	CBI6	U	Chloroethane	0.85	0.86	0.86
43	CBI7	U	Chloroethane	0.50	0.51	0.51
43	CBI8	U	Chloroethane	0.95	0.96	0.96
43	CBI9	U	Chloroethane	3.70	3.74	3.74
41	Guadalupe	U	Chloroethane	2.20	3.18	3.18
53	Altamont	U	Chloroform	0.011	0.013	0.012
53	Altamont	U	Chloroform	0.010	0.012	
54	Arbor Hills	U	Chloroform	0.0025	0.0026	0.0025
54	Arbor Hills	U	Chloroform	0.0025	0.0025	
54	Arbor Hills	U	Chloroform	0.0025	0.0025	
15	Azusa Land Reclamation	U	Chloroform	0.030	0.031	0.031
15	Azusa Land Reclamation	U	Chloroform	0.030	0.031	
15	Azusa Land Reclamation	U	Chloroform	0.030	0.031	
15	Azusa Land Reclamation	U	Chloroform	0.030	0.031	
12	BKK Landfill	Y	Chloroform	1.10	2.4	2.20
12	BKK Landfill	Y	Chloroform	0.66	1.5	
12	BKK Landfill	Y	Chloroform	1.20	2.6	
19	Bradley Pit	U	Chloroform	0.020	0.026	0.019
19	Bradley Pit	U	Chloroform	0.020	0.025	
19	Bradley Pit	U	Chloroform	0.020	0.030	
19	Bradley Pit	U	Chloroform	0.020	0.025	
6	Bradley Pit	U	Chloroform	0.0015	0.0022	
6	Bradley Pit	U	Chloroform	0.010	0.014	
6	Bradley Pit	U	Chloroform	0.010	0.014	
6	Bradley Pit	U	Chloroform	0.010	0.013	
7	Calabasas	Y	Chloroform	0.18	0.27	2.85
7	Calabasas	Y	Chloroform	4.00	7.22	
7	Calabasas	Y	Chloroform	0.58	1.05	
13	Carson	U	Chloroform	0.0025	0.0033	0.0040
13	Carson	U	Chloroform	0.0025	0.0034	
13	Carson	U	Chloroform	0.0025	0.0053	
43	CBI13	U	Chloroform	1.56	1.89	1.89
55	Chicopee	U	Chloroform	0.10	0.13	
56	Coyote Canyon	U	Chloroform	0.0020	0.0027	0.0032
56	Coyote Canyon	U	Chloroform	0.0020	0.0027	
56	Coyote Canyon	U	Chloroform	0.0030	0.0040	
56	Coyote Canyon	U	Chloroform	0.0030	0.0044	
56	Coyote Canyon	U	Chloroform	0.0019	0.0028	
56	Coyote Canyon	U	Chloroform	0.0019	0.0028	
57	Durham Rd.	U	Chloroform	0.00	0.00	0.01
57	Durham Rd.	U	Chloroform	0.00	0.00	
57	Durham Rd.	U	Chloroform	0.02	0.02	
27	Lyon Development	U	Chloroform	0.060	0.071	0.067

Summary Statistics of Site Averages (ppmv)

Chlorodifluoromethane	
Mean	2.526
Median	1.205
Standard Deviation	3.379
Variance	11.420
Kurtosis	7.684
Skewness	2.627
Range	12.632
Minimum	0.101
Maximum	12.733
Sum	32.837
Count	13.000
Normality Test (p)	<.05
Geometric Mean	1.304

Chloroethane	
Mean	2.372
Median	1.365
Standard Deviation	2.651
Variance	7.028
Kurtosis	1.325
Skewness	1.491
Range	9.163
Minimum	0.111
Maximum	9.274
Sum	59.308
Count	25.000
Normality Test (p)	<.01
Geometric Mean	1.251

Chloroform	
Mean	0.380
Median	0.024
Standard Deviation	0.811
Variance	0.657
Kurtosis	4.378
Skewness	2.336
Range	2.847
Minimum	0.001
Maximum	2.847
Sum	8.370
Count	22.000
Normality Test (p)	<0.01
Geometric Mean	0.03

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
27	Lyon Development	U	Chloroform	0.060	0.071			
27	Lyon Development	U	Chloroform	0.060	0.059			
10	Mission Canyon	N	Chloroform	0.0005	0.0021	0.019		
5	Mountaingate	N	Chloroform	0.0015	0.0043	0.0043		
5	Mountaingate	N	Chloroform	0.0015	0.0043			
5	Mountaingate	N	Chloroform	0.0015	0.0043			
5	Mountaingate	N	Chloroform	0.0015	0.0043			
58	Otay Annex	U	Chloroform	0.00050	0.00054	0.00054		
58	Otay Landfill	Y	Chloroform	0.00050	0.00068	0.00068		
22	Palos Verdes	Y	Chloroform	0.0041	0.018	0.12		
22	Palos Verdes	Y	Chloroform	0.00	0.01			
22	Palos Verdes	Y	Chloroform	0.00	0.01			
22	Palos Verdes	Y	Chloroform	0.00	0.01			
22	Palos Verdes	Y	Chloroform	0.01	0.04			
22	Palos Verdes	Y	Chloroform	0.00	0.02			
22	Palos Verdes	Y	Chloroform	0.00	0.02			
22	Palos Verdes	Y	Chloroform	0.00	0.02			
22	Palos Verdes	Y	Chloroform	0.00	0.02			
22	Palos Verdes	Y	Chloroform	0.01	0.04			
22	Palos Verdes	Y	Chloroform	0.01	0.03			
22	Palos Verdes	Y	Chloroform	0.00	0.02			
51	Palos Verdes	Y	Chloroform	0.25	0.80			
51	Palos Verdes	Y	Chloroform	0.25	0.64			
20	Penrose	U	Chloroform	0.02	0.019	0.030		
20	Penrose	U	Chloroform	0.02	0.019			
20	Penrose	U	Chloroform	0.02	0.034			
20	Penrose	U	Chloroform	0.02	0.034			
20	Penrose	U	Chloroform	0.02	0.036			
20	Penrose	U	Chloroform	0.02	0.035			
20	Penrose	U	Chloroform	0.02	0.030			
20	Penrose	U	Chloroform	0.02	0.029			
18	Puente Hills	N	Chloroform	0.17	0.21	0.22		
18	Puente Hills	N	Chloroform	0.17	0.22			
18	Puente Hills	N	Chloroform	0.17	0.22			
18	Puente Hills	N	Chloroform	0.17	0.22			
24	Puente Hills	N	Chloroform	0.24	0.35			
24	Puente Hills	N	Chloroform	0.030	0.042			
50	Puente Hills	N	Chloroform	0.20	0.24			
59	Rockingham	U	Chloroform	0.20	0.27	0.27		
1	Scholl Canyon	N	Chloroform	0.027	0.043	0.56		
1	Scholl Canyon	N	Chloroform	0.47	1.08			
9	Sheldon Street	U	Chloroform	0.00035	0.00070	0.00070	Chloromethane	
9	Sheldon Street	U	Chloroform	0.00035	0.00070		Mean	2.093
23	Toyon Canyon	N	Chloroform	0.064	0.069	0.069	Median	1.206
43	CBI10	U	Chloromethane	0.90	0.92	0.92	Standard Deviation	2.708
43	CBI11	U	Chloromethane	0.60	0.61	0.61	Variance	7.331
43	CBI12	U	Chloromethane	0.10	0.11	0.11	Kurtosis	3.548
43	CBI13	U	Chloromethane	1.12	1.36	1.36	Skewness	1.995
43	CBI14	U	Chloromethane	0.90	0.91	0.91	Range	10.192
43	CBI17	U	Chloromethane	1.25	1.26	1.26	Minimum	0.110
43	CBI18	U	Chloromethane	0.18	0.18	0.18	Maximum	10.302
43	CBI19	U	Chloromethane	0.20	0.20	0.20	Sum	43.957
43	CBI21	U	Chloromethane	0.28	0.28	0.28	Count	21.000
43	CBI23	U	Chloromethane	1.40	1.49	1.49	Normality Test (p)	<.01
43	CBI24	Y	Chloromethane	0.70	0.71	0.71		
43	CBI25	U	Chloromethane	7.19	7.25	7.25	Dichlorobenzene	
43	CBI26	U	Chloromethane	1.20	1.21	1.21	Mean	0.213
43	CBI27	U	Chloromethane	1.33	1.34	1.34	Median	0.213
43	CBI30	U	Chloromethane	1.34	1.35	1.35	Standard Deviation	0.165
43	CBI32	U	Chloromethane	6.10	6.13	6.13	Variance	0.027
43	CBI4	U	Chloromethane	3.73	3.92	3.92	Kurtosis	N/A
43	CBI5	U	Chloromethane	0.55	0.56	0.56	Skewness	N/A
43	CBI6	U	Chloromethane	0.24	0.24	0.24	Range	0.233
43	CBI8	U	Chloromethane	10.2	10.3	10.3	Minimum	0.096
43	CBI9	U	Chloromethane	3.60	3.64	3.64	Maximum	0.3295
55	Chicopee	U	Dichlorobenzene	0.08	0.10	0.10	Sum	0.426
56	Coyote Canyon	U	Dichlorobenzene	0.23	0.31	0.33	Count	2.000
56	Coyote Canyon	U	Dichlorobenzene	0.26	0.35			
43	CBI10	U	Dichlorodifluoromethane	11.8	12.0	12.0	Dichlorodifluoromethane	
43	CBI11	U	Dichlorodifluoromethane	7.45	7.53	7.53	Mean	15.670
43	CBI12	U	Dichlorodifluoromethane	1.30	1.43	1.43	Median	12.163
43	CBI14	U	Dichlorodifluoromethane	44.0	44.5	44.5	Standard Deviation	12.526
43	CBI15	U	Dichlorodifluoromethane	11.9	12.0	12.0	Variance	156.912
43	CBI17	U	Dichlorodifluoromethane	23.3	23.5	23.5	Kurtosis	-0.227
43	CBI18	U	Dichlorodifluoromethane	11.9	12.2	12.2	Skewness	0.764
43	CBI19	U	Dichlorodifluoromethane	14.3	14.3	14.3	Range	44.333
43	CBI2	U	Dichlorodifluoromethane	0.50	0.50	0.50	Minimum	0.192
43	CBI20	U	Dichlorodifluoromethane	8.85	8.90	8.90	Maximum	44.524
43	CBI21	U	Dichlorodifluoromethane	33.0	33.2	33.2	Sum	391.747
43	CBI22	U	Dichlorodifluoromethane	13.3	13.4	13.4	Count	25.000
43	CBI24	Y	Dichlorodifluoromethane	16.0	16.2	16.2	Normality Test (p)	<.20

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
43	CBI26	U	Dichlorodifluoromethane	11.5	11.5	11.5		
43	CBI27	U	Dichlorodifluoromethane	24.5	24.6	24.6	Dichlorofluoromethane	
43	CBI3	U	Dichlorodifluoromethane	1.10	1.10	1.10	Mean	7.342
43	CBI31	U	Dichlorodifluoromethane	19.0	19.0	19.0	Median	4.399
43	CBI32	U	Dichlorodifluoromethane	34.5	34.7	34.7	Standard Deviation	10.825
43	CBI33	U	Dichlorodifluoromethane	8.90	8.92	8.92	Variance	117.182
43	CBI34	U	Dichlorodifluoromethane	2.05	2.05	2.05	Kurtosis	4.227
43	CBI5	U	Dichlorodifluoromethane	4.90	4.95	4.95	Skewness	2.019
43	CBI6	U	Dichlorodifluoromethane	37.5	37.8	37.8	Range	25.885
43	CBI7	U	Dichlorodifluoromethane	16.5	16.9	16.9	Minimum	0.436
43	CBI8	U	Dichlorodifluoromethane	0.19	0.19	0.19	Maximum	26.321
43	CBI9	U	Dichlorodifluoromethane	30.0	30.3	30.3	Sum	36.711
43	CBI1	U	Dichlorofluoromethane	4.28	4.40	4.40	Count	5.000
43	CBI13	U	Dichlorofluoromethane	0.36	0.44	0.44	Normality Test (p)	<.05
43	CBI14	U	Dichlorofluoromethane	5.01	5.07	5.07	Geometric Mean	2.622
43	CBI30	U	Dichlorofluoromethane	0.48	0.48	0.48		
43	CBI8	U	Dichlorofluoromethane	26.1	26.3	26.3		
53	Altamont	U	Dichloromethane	33.0	39.8	27.4		
53	Altamont	U	Dichloromethane	13.0	15.1			
54	Arbor Hills	U	Dichloromethane	3.55	3.63	3.16		
54	Arbor Hills	U	Dichloromethane	2.84	2.87			
54	Arbor Hills	U	Dichloromethane	2.92	2.98			
43	CBI10	U	Dichloromethane	20.0	20.4	20.4		
43	CBI11	U	Dichloromethane	128	129	129		
43	CBI12	U	Dichloromethane	3.25	3.58	3.58		
43	CBI13	U	Dichloromethane	0.18	0.22	0.22		
43	CBI14	U	Dichloromethane	38.8	39.3	39.3		
43	CBI15	U	Dichloromethane	0.20	0.20	0.20		
43	CBI16	Y	Dichloromethane	0.70	0.71	0.71	Dichloromethane	
43	CBI17	U	Dichloromethane	8.00	8.08	8.08	Mean	19.339
43	CBI18	U	Dichloromethane	14.0	14.3	14.3	Median	14.286
43	CBI19	U	Dichloromethane	3.00	3.01	3.01	Standard Deviation	23.565
43	CBI2	U	Dichloromethane	2.00	2.02	2.02	Variance	555.330
43	CBI20	U	Dichloromethane	9.25	9.31	9.31	Kurtosis	12.485
43	CBI21	U	Dichloromethane	44.0	44.4	44.4	Skewness	3.012
43	CBI22	U	Dichloromethane	0.33	0.33	0.33	Range	128.716
43	CBI23	U	Dichloromethane	14.0	14.9	14.9	Minimum	0.202
43	CBI24	Y	Dichloromethane	29.9	30.4	30.4	Maximum	128.918
43	CBI25	U	Dichloromethane	24.5	24.7	24.7	Sum	715.538
43	CBI26	U	Dichloromethane	2.00	2.01	2.01	Count	37.000
43	CBI27	U	Dichloromethane	24.7	24.8	24.8	Normality Test (p)	<.01
43	CBI30	U	Dichloromethane	1.48	1.49	1.49		
43	CBI32	U	Dichloromethane	35.0	35.2	35.2		
43	CBI4	U	Dichloromethane	18.4	19.3	19.3		
43	CBI5	U	Dichloromethane	6.30	6.36	6.36		
43	CBI6	U	Dichloromethane	17.0	17.1	17.1		
43	CBI7	U	Dichloromethane	3.45	3.53	3.53		
43	CBI8	U	Dichloromethane	51.0	51.4	51.4		
43	CBI9	U	Dichloromethane	50.0	50.5	50.5		
55	Chicopee	U	Dichloromethane	11.9	15.3	15.3		
56	Coyote Canyon	U	Dichloromethane	7.35	9.79	11.3		
56	Coyote Canyon	U	Dichloromethane	9.65	12.9			
56	Coyote Canyon	U	Dichloromethane	7.58	10.1	12.5		
56	Coyote Canyon	U	Dichloromethane	7.12	9.48			
56	Coyote Canyon	U	Dichloromethane	9.50	12.6			
56	Coyote Canyon	U	Dichloromethane	9.64	14.3			
56	Coyote Canyon	U	Dichloromethane	9.70	14.1			
56	Coyote Canyon	U	Dichloromethane	9.60	14.2			
57	Durham Rd.	U	Dichloromethane	6.00	7.89	7.62		
57	Durham Rd.	U	Dichloromethane	6.10	7.35			
57	Durham Rd.	U	Dichloromethane	6.40	7.62			
41	Guadalupe	U	Dichloromethane	6.10	7.31	7.31		
58	Otay Annex	U	Dichloromethane	12.4	16.8	16.8		
84	Otay Landfill	Y	Dichloromethane	22.8	24.6	24.6		
59	Rockingham	U	Dichloromethane	24.9	33.1	33.1		
54	Arbor Hills	U	Dimethyl disulfide	0.11	0.11	0.11		
54	Arbor Hills	U	Dimethyl disulfide	0.11	0.11			
54	Arbor Hills	U	Dimethyl sulfide	3.07	3.12	3.20		
54	Arbor Hills Landfill	U	Dimethyl sulfide	3.23	3.29			
15	Azusa Land Reclamation	U	Dimethyl sulfide	47.0	49.0	73.5		
15	Azusa Land Reclamation	U	Dimethyl sulfide	74.0	77.2		Dimethyl sulfide	
15	Azusa Land Reclamation	U	Dimethyl sulfide	73.0	76.1		Mean	13.488
15	Azusa Land Reclamation	U	Dimethyl sulfide	74.0	77.2		Median	7.821
15	Azusa Land Reclamation	U	Dimethyl sulfide	74.0	77.2		Standard Deviation	21.553
15	Azusa Land Reclamation	U	Dimethyl sulfide	76.0	79.3		Variance	464.516
15	Azusa Land Reclamation	U	Dimethyl sulfide	75.0	78.2		Kurtosis	8.810
12	BKK Landfill	Y	Dimethyl sulfide	6.70	15.02	14.81	Skewness	2.906
12	BKK Landfill	Y	Dimethyl sulfide	6.60	14.57		Range	73.305
12	BKK Landfill	Y	Dimethyl sulfide	6.90	14.90		Minimum	0.150
12	BKK Landfill	Y	Dimethyl sulfide	5.80	12.50		Maximum	73.455
12	BKK Landfill	Y	Dimethyl sulfide	6.30	13.38		Sum	134.882

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Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
12	BKK Landfill	Y	Dimethyl sulfide	6.60	19.08		Count	10.000
12	BKK Landfill	Y	Dimethyl sulfide	6.70	14.60		Normality Test (p)	<.01
12	BKK Landfill	Y	Dimethyl sulfide	6.70	14.35			
12	BKK Landfill	Y	Dimethyl sulfide	6.70	14.92		Ethane	
6	Bradley Pit	U	Dimethyl sulfide	7.00	9.59	9.59	Mean	889.150
7	Calabasas	Y	Dimethyl sulfide	2.20	3.35	3.35	Median	1124.622
56	Coyote Canyon	U	Dimethyl sulfide	0.05	0.07	0.15	Standard Deviation	598.811
56	Coyote Canyon	U	Dimethyl sulfide	0.17	0.23		Variance	358574.756
56	Coyote Canyon	U	Dimethyl sulfide	8.70	12.9	11.7	Kurtosis	-1.057
56	Coyote Canyon	U	Dimethyl sulfide	7.90	10.5		Skewness	-0.135
24	Puente Hills	N	Dimethyl sulfide	8.50	12.4	9.12	Range	1779.719
24	Puente Hills	N	Dimethyl sulfide	8.00	11.5		Minimum	21.900
24	Puente Hills	N	Dimethyl sulfide	7.80	10.8		Maximum	1801.619
24	Puente Hills	N	Dimethyl sulfide	7.90	10.9		Sum	8002.349
50	Puente Hills	N	Dimethyl sulfide	0.0032	0.0039		Count	9.000
1	Scholl Canyon	N	Dimethyl sulfide	1.30	2.97	2.97	Normality Test (p)	>.20
39	Sunshine Canyon	U	Dimethyl sulfide	6.20	6.53	6.53		
43	CBI13	U	Ethane	930	1125	1125		
43	CBI14	Y	Ethane	1780	1802	1802		
43	CBI24	U	Ethane	269	273	273	Ethanol	
43	CBI25	U	Ethane	1420	1431	1431	Mean	27.205
43	CBI30	U	Ethane	930	938	938	Median	27.205
43	CBI4	U	Ethane	877	921	921	Standard Deviation	30.005
43	CBI8	U	Ethane	1240	1250	1250	Variance	900.281
102	Fresh Kills Landfill	U	Ethane	16.9	21.9	21.9	Kurtosis	N/A
103	Puente Hills	U	Ethane	22.3	240.4	240.4	Skewness	N/A
41	Guadalupe	U	Ethanol	5.00	5.99	5.99	Range	42.433
60	Sunshine Canyon	U	Ethanol	46.0	48.4	48.4	Minimum	5.988
54	Arbor Hills	U	Ethyl benzene	18.7	19.1	19.4	Maximum	48.421
54	Arbor Hills	U	Ethyl benzene	19.6	19.8		Sum	54.409
54	Arbor Hills	U	Ethyl benzene	19.0	19.4		Count	2.000
54	Arbor Hills	U	Ethyl benzene	18.7	19.1	19.4		
54	Arbor Hills	U	Ethyl benzene	19.6	19.8			
54	Arbor Hills	U	Ethyl benzene	19.0	19.4			
43	CBI1	U	Ethyl benzene	6.15	6.32	6.32		
43	CBI10	U	Ethyl benzene	5.70	5.81	5.81		
43	CBI11	U	Ethyl benzene	5.00	5.06	5.06		
43	CBI12	U	Ethyl benzene	4.06	4.47	4.47		
43	CBI13	U	Ethyl benzene	37.0	44.7	44.7		
43	CBI14	U	Ethyl benzene	4.20	4.25	4.25		
43	CBI15	U	Ethyl benzene	0.23	0.23	0.23		
43	CBI16	Y	Ethyl benzene	1.30	1.32	1.32		
43	CBI17	U	Ethyl benzene	0.15	0.15	0.15		
43	CBI18	U	Ethyl benzene	7.00	7.14	7.14		
43	CBI19	U	Ethyl benzene	0.20	0.20	0.20		
43	CBI2	U	Ethyl benzene	0.55	0.55	0.55		
43	CBI20	U	Ethyl benzene	10.9	11.0	11.0		
43	CBI21	U	Ethyl benzene	0.25	0.25	0.25		
43	CBI22	U	Ethyl benzene	5.27	5.32	5.32	Ethyl benzene	
43	CBI23	U	Ethyl benzene	4.00	4.25	4.25	Mean	11.417
43	CBI24	Y	Ethyl benzene	35.4	35.9	35.9	Median	4.609
43	CBI25	U	Ethyl benzene	48.1	48.5	48.5	Standard Deviation	15.286
43	CBI26	U	Ethyl benzene	0.70	0.70	0.70	Variance	233.648
43	CBI27	U	Ethyl benzene	3.73	3.76	3.76	Kurtosis	2.991
43	CBI28	U	Ethyl benzene	0.80	0.80	0.80	Skewness	1.901
43	CBI29	U	Ethyl benzene	38.7	40.9	40.9	Range	61.954
43	CBI3	U	Ethyl benzene	4.40	4.41	4.41	Minimum	0.152
43	CBI30	U	Ethyl benzene	23.4	23.6	23.6	Maximum	62.105
43	CBI31	U	Ethyl benzene	4.60	4.61	4.61	Sum	445.267
43	CBI32	U	Ethyl benzene	0.65	0.65	0.65	Count	39.000
43	CBI33	U	Ethyl benzene	2.73	2.74	2.74	Normality Test (p)	<.01
43	CBI4	U	Ethyl benzene	16.2	17.0	17.0		
43	CBI5	U	Ethyl benzene	6.75	6.82	6.82		
43	CBI6	U	Ethyl benzene	0.30	0.30	0.30		
43	CBI7	U	Ethyl benzene	22.0	22.5	22.5		
43	CBI8	U	Ethyl benzene	7.22	7.28	7.28		
43	CBI9	U	Ethyl benzene	3.80	3.84	3.84		
41	Guadalupe	U	Ethyl benzene	3.10	3.71	3.71		
27	Lyon Development	U	Ethyl benzene	5.50	6.47	4.61		
27	Lyon Development	U	Ethyl benzene	2.90	3.45			
27	Lyon Development	U	Ethyl benzene	3.90	3.90			
59	Rockingham	U	Ethyl benzene	8.00	10.6	10.6		
60	Sunshine Canyon	U	Ethyl benzene	59.0	62.1	62.1		
54	Arbor Hills	U	Ethyl mercaptan	0.29	0.30	0.21	Ethyl mercaptan	
54	Arbor Hills	U	Ethyl mercaptan	0.13	0.13		Mean	2.283
12	BKK Landfill	Y	Ethyl mercaptan	1.90	4.26	5.39	Median	1.250
12	BKK Landfill	Y	Ethyl mercaptan	1.90	4.19		Standard Deviation	2.736
12	BKK Landfill	Y	Ethyl mercaptan	2.20	4.75		Variance	7.487
12	BKK Landfill	Y	Ethyl mercaptan	1.70	3.66		Kurtosis	N/A
12	BKK Landfill	Y	Ethyl mercaptan	2.30	4.88		Skewness	1.457
12	BKK Landfill	Y	Ethyl mercaptan	2.90	8.38		Range	5.172

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
12	BKK Landfill	Y	Ethyl mercaptan	3.10	6.75	
12	BKK Landfill	Y	Ethyl mercaptan	2.60	5.57	
12	BKK Landfill	Y	Ethyl mercaptan	2.70	6.01	
56	Coyote Canyon	U	Ethyl mercaptan	0.40	0.60	1.25
56	Coyote Canyon	U	Ethyl mercaptan	1.40	1.90	
53	Altamont	U	Ethylene dibromide	0.00050	0.00060	0.00059
53	Altamont	U	Ethylene dibromide	0.00050	0.00058	
57	Durham Rd.	U	Ethylene dibromide	0.00050	0.00070	0.00063
57	Durham Rd.	U	Ethylene dibromide	0.00050	0.00060	
57	Durham Rd.	U	Ethylene dibromide	0.00050	0.00060	
41	Guadalupe	U	Ethylester acetic acid	34.1	40.8	40.8
41	Guadalupe	U	Ethylester butanoic acid	25.6	30.7	30.7
41	Guadalupe	U	Ethylester propanoic acid	4.70	5.63	5.63
43	CBI10	U	Fluorotrichloromethane	0.60	0.61	0.61
43	CBI11	U	Fluorotrichloromethane	2.85	2.88	2.88
43	CBI12	U	Fluorotrichloromethane	0.48	0.53	0.53
43	CBI13	U	Fluorotrichloromethane	0.66	0.80	0.80
43	CBI14	U	Fluorotrichloromethane	1.35	1.37	1.37
43	CBI15	U	Fluorotrichloromethane	0.73	0.74	0.74
43	CBI16	Y	Fluorotrichloromethane	0.70	0.71	0.71
43	CBI17	U	Fluorotrichloromethane	2.35	2.37	2.37
43	CBI18	U	Fluorotrichloromethane	1.30	1.33	1.33
43	CBI19	U	Fluorotrichloromethane	1.05	1.05	1.05
43	CBI20	U	Fluorotrichloromethane	3.25	3.27	3.27
43	CBI21	U	Fluorotrichloromethane	1.08	1.09	1.09
43	CBI22	U	Fluorotrichloromethane	0.67	0.68	0.68
43	CBI23	U	Fluorotrichloromethane	2.10	2.23	2.23
43	CBI24	Y	Fluorotrichloromethane	0.06	0.06	0.06
43	CBI25	U	Fluorotrichloromethane	0.77	0.78	0.78
43	CBI26	U	Fluorotrichloromethane	0.45	0.45	0.45
43	CBI27	U	Fluorotrichloromethane	0.50	0.50	0.50
43	CBI30	U	Fluorotrichloromethane	0.47	0.47	0.47
43	CBI32	U	Fluorotrichloromethane	7.90	7.94	7.94
43	CBI33	U	Fluorotrichloromethane	0.10	0.10	0.10
43	CBI4	U	Fluorotrichloromethane	0.72	0.76	0.76
43	CBI5	U	Fluorotrichloromethane	0.25	0.25	0.25
43	CBI6	U	Fluorotrichloromethane	11.9	12.0	12.0
43	CBI7	U	Fluorotrichloromethane	0.20	0.20	0.20
43	CBI8	U	Fluorotrichloromethane	0.63	0.64	0.64
43	CBI9	U	Fluorotrichloromethane	1.10	1.11	1.11
43	CBI11	U	Hexane	6.50	6.57	6.57
43	CBI13	U	Hexane	2.49	3.01	3.01
43	CBI14	U	Hexane	20.8	21.1	21.1
43	CBI16	Y	Hexane	2.40	2.44	2.44
43	CBI17	U	Hexane	3.00	3.03	3.03
43	CBI18	U	Hexane	4.17	4.26	4.26
43	CBI19	U	Hexane	1.50	1.51	1.51
43	CBI24	Y	Hexane	6.34	6.44	6.44
43	CBI25	U	Hexane	13.4	13.5	13.5
43	CBI27	U	Hexane	7.13	7.18	7.18
43	CBI30	U	Hexane	6.06	6.12	6.12
43	CBI31	U	Hexane	1.00	1.00	1.00
43	CBI32	U	Hexane	10.0	10.1	10.1
43	CBI33	U	Hexane	3.83	3.84	3.84
43	CBI4	U	Hexane	7.30	7.67	7.67
43	CBI5	U	Hexane	11.3	11.4	11.4
43	CBI6	U	Hexane	7.00	7.05	7.05
43	CBI8	U	Hexane	18.0	18.1	18.1
43	CBI9	U	Hexane	25.0	25.3	25.3
54	Arbor Hills	U	Hydrogen sulfide	20.7	21.1	20.9
54	Arbor Hills	U	Hydrogen sulfide	20.4	20.8	
15	Azusa Land Reclamation	U	Hydrogen sulfide	28.0	29.2	29.2
15	Azusa Land Reclamation	U	Hydrogen sulfide	28.0	29.2	29.2
15	Azusa Land Reclamation	U	Hydrogen sulfide	34.0	35.5	35.5
15	Azusa Land Reclamation	U	Hydrogen sulfide	36.0	37.5	37.5
15	Azusa Land Reclamation	U	Hydrogen sulfide	39.0	40.7	40.7
15	Azusa Land Reclamation	U	Hydrogen sulfide	36.0	37.5	37.5
12	BKK Landfill	Y	Hydrogen sulfide	3.70	8.30	13.0
12	BKK Landfill	Y	Hydrogen sulfide	5.30	11.7	
12	BKK Landfill	Y	Hydrogen sulfide	8.20	17.7	
12	BKK Landfill	Y	Hydrogen sulfide	0.50	1.08	
12	BKK Landfill	Y	Hydrogen sulfide	2.30	4.88	
12	BKK Landfill	Y	Hydrogen sulfide	5.80	16.8	
12	BKK Landfill	Y	Hydrogen sulfide	7.60	16.6	
12	BKK Landfill	Y	Hydrogen sulfide	8.40	18.0	
12	BKK Landfill	Y	Hydrogen sulfide	10.0	22.3	
6	Bradley Pit	U	Hydrogen sulfide	64.0	87.7	80.8
6	Bradley Pit	U	Hydrogen sulfide	54.0	74.0	
7	Calabasas	Y	Hydrogen sulfide	11.3	17.2	17.2
56	Coyote Canyon	U	Hydrogen sulfide	46.4	68.5	62.5
56	Coyote Canyon	U	Hydrogen sulfide	42.4	56.5	

Summary Statistics of Site Averages (ppmv)	
Minimum	0.214
Maximum	5.385
Sum	6.849
Count	3.000
Ethylene dibromide	
Mean	6.126E-004
Median	6.126E-004
Standard Deviation	2.930E-005
Variance	8.583E-010
Kurtosis	N/A
Skewness	N/A
Range	4.143E-005
Minimum	5.919E-004
Maximum	6.333E-004
Sum	1.225E-003
Count	2.000
Fluorotrichloromethane	
Mean	1.663
Median	0.756
Standard Deviation	2.586
Variance	6.689
Kurtosis	10.640
Skewness	3.182
Range	11.923
Minimum	0.061
Maximum	11.984
Sum	44.904
Count	27.000
Normality Test (p)	<.01
Hexane	
Mean	8.397
Median	6.572
Standard Deviation	6.777
Variance	45.934
Kurtosis	1.031
Skewness	1.288
Range	24.251
Minimum	1.002
Maximum	25.253
Sum	159.536
Count	19.000
Normality Test (p)	<.05
Hydrogen sulfide	
Mean	36.604
Median	35.461
Standard Deviation	24.165
Variance	583.963
Kurtosis	-0.128
Skewness	0.652
Range	82.093
Minimum	0.012
Maximum	82.105
Sum	549.056
Count	15.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
51	Palos Verdes	Y	Hydrogen sulfide	20.0	51.2	51.2
50	Puente Hills	N	Hydrogen sulfide	0.010	0.012	0.012
1	Scholl Canyon	N	Hydrogen sulfide	5.10	11.7	11.7
60	Sunshine Canyon	U	Hydrogen sulfide	78.0	82.1	82.1
12	BKK Landfill	Y	i-Propyl mercaptan	1.80	4.04	4.60
12	BKK Landfill	Y	i-Propyl mercaptan	1.60	3.53	
12	BKK Landfill	Y	i-Propyl mercaptan	1.70	3.67	
12	BKK Landfill	Y	i-Propyl mercaptan	1.70	3.66	
12	BKK Landfill	Y	i-Propyl mercaptan	1.90	4.03	
12	BKK Landfill	Y	i-Propyl mercaptan	2.50	7.23	
12	BKK Landfill	Y	i-Propyl mercaptan	2.30	5.01	
12	BKK Landfill	Y	i-Propyl mercaptan	2.40	5.14	
12	BKK Landfill	Y	i-Propyl mercaptan	2.30	5.12	
41	Guadalupe	U	Isooctanol	7.20	8.62	8.62
103	Fresh Kills Landfill	U	Mercury (total)	0.00149	0.00149	0.00149
94	Landfill A	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill B	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill C	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill D	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill E	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill F	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill G	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill H	U	Mercury (total)	0.000134	0.000134	0.000134
94	Landfill I	U	Mercury (total)	0.000134	0.000134	0.000134
95	Landfill A	U	Mercury (total)	0.000545	0.000545	0.000545
95	Landfill B	U	Mercury (total)	0.000246	0.000246	0.000246
95	Landfill C	U	Mercury (total)	0.00004	0.00004	0.00004
97	Mountaingate Landfill	U	Mercury (total)	0.000013	0.000013	0.000013
41	Guadalupe	U	Methyl cyclohexane	26.0	31.1	31.1
43	CBI10	U	Methyl ethyl ketone	5.00	5.10	5.10
43	CBI11	U	Methyl ethyl ketone	4.95	5.01	5.01
43	CBI12	U	Methyl ethyl ketone	12.0	13.2	13.2
43	CBI14	U	Methyl ethyl ketone	1.48	1.50	1.50
43	CBI15	U	Methyl ethyl ketone	3.75	3.79	3.79
43	CBI18	U	Methyl ethyl ketone	7.67	7.83	7.83
43	CBI20	U	Methyl ethyl ketone	11.0	11.1	11.1
43	CBI22	U	Methyl ethyl ketone	31.3	31.6	31.6
43	CBI23	U	Methyl ethyl ketone	5.50	5.84	5.84
43	CBI24	Y	Methyl ethyl ketone	18.8	19.0	19.0
43	CBI26	U	Methyl ethyl ketone	6.00	6.03	6.03
43	CBI27	U	Methyl ethyl ketone	5.00	5.04	5.04
43	CBI3	U	Methyl ethyl ketone	1.60	1.60	1.60
43	CBI31	U	Methyl ethyl ketone	21.0	21.0	21.0
43	CBI32	U	Methyl ethyl ketone	3.65	3.67	3.67
43	CBI33	U	Methyl ethyl ketone	6.33	6.34	6.34
43	CBI5	U	Methyl ethyl ketone	20.0	20.2	20.2
43	CBI6	U	Methyl ethyl ketone	4.70	4.73	4.73
43	CBI7	U	Methyl ethyl ketone	57.5	58.9	58.9
43	CBI9	U	Methyl ethyl ketone	15.0	15.2	15.2
41	Guadalupe	U	Methyl ethyl ketone	13.6	16.3	16.3
59	Rockingham	U	Methyl ethyl ketone	10.8	14.4	14.4
43	CBI11	U	Methyl isobutyl ketone	1.15	1.16	1.16
43	CBI12	U	Methyl isobutyl ketone	0.50	0.55	0.55
43	CBI15	U	Methyl isobutyl ketone	0.45	0.45	0.45
43	CBI18	U	Methyl isobutyl ketone	2.50	2.55	2.55
43	CBI20	U	Methyl isobutyl ketone	4.00	4.02	4.02
43	CBI22	U	Methyl isobutyl ketone	3.33	3.36	3.36
43	CBI23	U	Methyl isobutyl ketone	1.00	1.06	1.06
43	CBI24	Y	Methyl isobutyl ketone	5.00	5.08	5.08
43	CBI27	U	Methyl isobutyl ketone	1.00	1.01	1.01
43	CBI3	U	Methyl isobutyl ketone	0.70	0.70	0.70
43	CBI31	U	Methyl isobutyl ketone	1.00	1.00	1.00
43	CBI33	U	Methyl isobutyl ketone	3.33	3.34	3.34
43	CBI5	U	Methyl isobutyl ketone	6.50	6.57	6.57
43	CBI7	U	Methyl isobutyl ketone	11.50	11.78	11.78
43	CBI9	U	Methyl isobutyl ketone	1.20	1.21	1.21
54	Arbor Hills	U	Methyl mercaptan	0.29	0.30	0.52
54	Arbor Hills	U	Methyl mercaptan	0.73	0.74	
54	Arbor Hills	U	Methyl mercaptan	0.51	0.54	0.54
15	Azusa Land Reclamation	U	Methyl mercaptan	12.0	12.5	9.67
15	Azusa Land Reclamation	U	Methyl mercaptan	11.0	11.5	
15	Azusa Land Reclamation	U	Methyl mercaptan	10.0	10.4	
15	Azusa Land Reclamation	U	Methyl mercaptan	10.0	10.4	
15	Azusa Land Reclamation	U	Methyl mercaptan	10.0	10.4	
15	Azusa Land Reclamation	U	Methyl mercaptan	11.0	11.5	
15	Azusa Land Reclamation	U	Methyl mercaptan	0.88	0.92	
12	BKK Landfill	Y	Methyl mercaptan	2.50	5.61	4.60
12	BKK Landfill	Y	Methyl mercaptan	2.10	4.64	
12	BKK Landfill	Y	Methyl mercaptan	2.40	5.18	
12	BKK Landfill	Y	Methyl mercaptan	1.30	2.80	
12	BKK Landfill	Y	Methyl mercaptan	1.60	3.40	

Summary Statistics of Site Averages (ppmv)

Mercury (total)	
Mean	2.529E-004
Median	1.340E-004
Standard Deviation	3.768E-004
Variance	1.420E-007
Kurtosis	1.047E+001
Skewness	3.153E+000
Range	1.477E-003
Minimum	1.300E-005
Maximum	1.490E-003
Sum	3.540E-003
Count	14.000

Methyl ethyl ketone	
Mean	12.609
Median	7.085
Standard Deviation	12.889
Variance	166.126
Kurtosis	7.547
Skewness	2.463
Range	57.416
Minimum	1.498
Maximum	58.914
Sum	277.401
Count	22.000
Normality Test (p)	<.05

Methyl isobutyl ketone	
Mean	2.923
Median	1.212
Standard Deviation	3.066
Variance	9.402
Kurtosis	4.324
Skewness	1.958
Range	11.328
Minimum	0.454
Maximum	11.783
Sum	43.849
Count	15.000
Normality Test (p)	<.05
Geometric Mean	1.870

Methyl mercaptan	
Mean	4.334
Median	2.707
Standard Deviation	4.488
Variance	20.144
Kurtosis	0.228
Skewness	1.212
Range	12.113
Minimum	0.519
Maximum	12.632
Sum	34.674
Count	8.000
Normality Test (p)	<.20
Geometric Mean	2.490

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
12	BKK Landfill	Y	Methyl mercaptan	2.10	6.07	
12	BKK Landfill	Y	Methyl mercaptan	2.00	4.36	
12	BKK Landfill	Y	Methyl mercaptan	2.20	4.71	
12	BKK Landfill	Y	Methyl mercaptan	2.10	4.68	
6	Bradley Pit	U	Methyl mercaptan	2.20	3.01	3.01
56	Coyote Canyon	U	Methyl mercaptan	1.80	2.40	2.40
24	Puente Hills	N	Methyl mercaptan	1.10	1.60	1.30
24	Puente Hills	N	Methyl mercaptan	0.90	1.29	
24	Puente Hills	N	Methyl mercaptan	1.30	1.81	
24	Puente Hills	N	Methyl mercaptan	1.30	1.80	
50	Puente Hills	N	Methyl mercaptan	0.0014	0.0017	
60	Sunshine Canyon	U	Methyl mercaptan	12.0	12.6	12.6
41	Guadalupe	U	Methylester acetic acid	5.10	6.11	6.11
41	Guadalupe	U	Methylester butanoic acid	49.6	59.4	59.4
54	Arbor Hills	U	NMOC (as hexane)	1435	1469	1539
54	Arbor Hills	U	NMOC (as hexane)	1833	1850	
54	Arbor Hills	U	NMOC (as hexane)	1348	1374	
12	BKK Landfill	Y	NMOC (as hexane)	3133	6902	4533
12	BKK Landfill	Y	NMOC (as hexane)	1408	3306	
12	BKK Landfill	Y	NMOC (as hexane)	1543	3392	
6	Bradley Pit	U	NMOC (as hexane)	518	704	780
6	Bradley Pit	U	NMOC (as hexane)	757	947	
17	Bradley Pit	U	NMOC (as hexane)	335	419	
17	Bradley Pit	U	NMOC (as hexane)	407	509	
17	Bradley Pit	U	NMOC (as hexane)	848	1268	
17	Bradley Pit	U	NMOC (as hexane)	833	1282	
17	Bradley Pit	U	NMOC (as hexane)	735	910	
17	Bradley Pit	U	NMOC (as hexane)	705	851	
19	Bradley Pit	U	NMOC (as hexane)	202	306	
19	Bradley Pit	U	NMOC (as hexane)	555	707	
19	Bradley Pit	U	NMOC (as hexane)	723	932	
19	Bradley Pit	U	NMOC (as hexane)	717	889	
41	Bradley Pit	U	NMHC (as hexane)	285	412	940
26	CA	N	NMHC (as hexane)	162	183	183
26	CA	U	NMHC (as hexane)	912	1586	1586
7	Calabasas	Y	NMOC (as hexane)	1372	2432	2439
7	Calabasas	Y	NMOC (as hexane)	1247	2296	
7	Calabasas	Y	NMOC (as hexane)	1435	2590	
13	Carson	U	NMOC (as hexane)	342	457	712
13	Carson	U	NMOC (as hexane)	305	420	
13	Carson	U	NMOC (as hexane)	600	1261	
26	FL	U	NMHC (as hexane)	314	319	319
26	IL	U	NMHC (as hexane)	210	234	234
10	Mission Canyon	N	NMOC (as hexane)	26	105	105
5	Mountaingate	N	NMOC (as hexane)	88	254	245
5	Mountaingate	N	NMOC (as hexane)	70	202	
5	Mountaingate	N	NMOC (as hexane)	102	293	
5	Mountaingate	N	NMOC (as hexane)	80	230	
26	PA	Y	NMHC (as hexane)	411	459	459
22	Palos Verdes	Y	NMOC (as hexane)	475	2420	4337
22	Palos Verdes	Y	NMOC (as hexane)	562	2065	
22	Palos Verdes	Y	NMOC (as hexane)	190	731	
22	Palos Verdes	Y	NMOC (as hexane)	197	771	
22	Palos Verdes	Y	NMOC (as hexane)	210	787	
51	Palos Verdes	Y	NMOC (as hexane)	8567	21910	
51	Palos Verdes	Y	NMOC (as hexane)	527	1677	
20	Penrose	U	NMOC (as hexane)	130	167	273
20	Penrose	U	NMOC (as hexane)	147	185	
20	Penrose	U	NMOC (as hexane)	177	304	
20	Penrose	U	NMOC (as hexane)	322	548	
20	Penrose	U	NMOC (as hexane)	99	240	
20	Penrose	U	NMOC (as hexane)	102	241	
20	Penrose	U	NMOC (as hexane)	117	233	
20	Penrose	U	NMOC (as hexane)	138	268	
61	Pinelands	U	NMOC (as hexane)	145	166	166
18	Puente Hills	N	NMOC (as hexane)	322	418	957
18	Puente Hills	N	NMOC (as hexane)	368	496	
18	Puente Hills	N	NMOC (as hexane)	342	456	
18	Puente Hills	N	NMOC (as hexane)	308	408	
24	Puente Hills	N	NMOC (as hexane)	1077	1565	
24	Puente Hills	N	NMOC (as hexane)	1035	1485	
24	Puente Hills	N	NMOC (as hexane)	852	1176	
24	Puente Hills	N	NMOC (as hexane)	903	1255	
50	Puente Hills	N	NMOC (as hexane)	1118	1355	
59	Rockingham	U	NMOC (as hexane)	129	172	172
1	Scholl Canyon	N	TGNMHC (hexane)	397	593	880
1	Scholl Canyon	N	TGNMHC (hexane)	672	1166	
9	Sheldon Street	U	NMOC (as hexane)	480	621	364
9	Sheldon Street	U	NMOC (as hexane)	292	388	
9	Sheldon Street	U	NMOC (as hexane)	113	315	
9	Sheldon Street	U	NMOC (as hexane)	49.7	133	

Summary Statistics of Site Averages (ppmv)

NMOC (no & unknown co-disp.)	
Mean	595.381
Median	427.486
Standard Deviation	457.183
Variance	209016.440
Kurtosis	0.224
Skewness	0.993
Range	1481.062
Minimum	104.938
Maximum	1586.000
Sum	10716.865
Count	18.000
Normality Test (p)	<.10

NMOC (co-disposal)	
Mean	2423.345
Median	2439.391
Standard Deviation	2017.426
Variance	4070006.967
Kurtosis	-2.969
Skewness	-0.006
Range	4185.168
Minimum	348.00
Maximum	4533.168
Sum	12116.725
Count	5.000
Normality Test (p)	>.20

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
60	Sunshine Canyon	U	NMOC (as hexane)	733	772	772
23	Toyon Canyon	N	TGNMHC (hexane)	527	571	491
23	Toyon Canyon	N	TGNMHC (hexane)	455	485	
26	WI	Y	NMHC (as hexane)	296	348	348
43	CBI11	U	Pentane	3.25	3.29	3.29
43	CBI13	U	Pentane	0.58	0.70	0.70
43	CBI14	U	Pentane	11.1	11.2	11.2
43	CBI16	Y	Pentane	1.20	1.22	1.22
43	CBI17	U	Pentane	0.50	0.51	0.51
43	CBI18	U	Pentane	3.83	3.91	3.91
43	CBI19	U	Pentane	1.00	1.00	1.00
43	CBI24	Y	Pentane	0.39	0.40	0.40
43	CBI26	U	Pentane	0.50	0.50	0.50
43	CBI27	U	Pentane	46.5	46.9	46.9
43	CBI30	U	Pentane	3.96	4.00	4.00
43	CBI32	U	Pentane	9.00	9.05	9.05
43	CBI33	U	Pentane	1.10	1.10	1.10
43	CBI5	U	Pentane	17.6	17.8	17.8
43	CBI6	U	Pentane	18.0	18.1	18.1
43	CBI8	U	Pentane	0.67	0.68	0.68
43	CBI9	U	Pentane	45.0	45.5	45.5
53	Altamont	U	Perchloroethylene	2.30	2.77	2.61
53	Altamont	U	Perchloroethylene	2.10	2.44	
54	Arbor Hills	U	Perchloroethylene	7.74	7.92	7.63
54	Arbor Hills	U	Perchloroethylene	7.78	7.85	
54	Arbor Hills	U	Perchloroethylene	6.98	7.12	
15	Azusa Land Reclamation	U	Perchloroethylene	3.50	3.65	2.68
15	Azusa Land Reclamation	U	Perchloroethylene	3.60	3.75	
15	Azusa Land Reclamation	U	Perchloroethylene	3.90	4.07	
15	Azusa Land Reclamation	U	Perchloroethylene	1.90	1.98	
15	Azusa Land Reclamation	U	Perchloroethylene	2.30	2.40	
15	Azusa Land Reclamation	U	Perchloroethylene	2.90	3.02	
15	Azusa Land Reclamation	U	Perchloroethylene	0.33	0.34	
15	Azusa Land Reclamation	U	Perchloroethylene	1.40	1.46	
15	Azusa Land Reclamation	U	Perchloroethylene	3.30	3.44	
12	BKK Landfill	Y	Perchloroethylene	24.0	52.9	64.5
12	BKK Landfill	Y	Perchloroethylene	14.0	32.9	
12	BKK Landfill	Y	Perchloroethylene	49.0	108	
17	Bradley Pit	U	Perchloroethylene	16.0	19.8	10.4
17	Bradley Pit	U	Perchloroethylene	14.0	21.5	
17	Bradley Pit	U	Perchloroethylene	16.0	23.9	
17	Bradley Pit	U	Perchloroethylene	16.0	19.3	
17	Bradley Pit	U	Perchloroethylene	6.00	7.51	
17	Bradley Pit	U	Perchloroethylene	7.80	9.76	
19	Bradley Pit	U	Perchloroethylene	6.20	7.69	
19	Bradley Pit	U	Perchloroethylene	7.30	9.30	
19	Bradley Pit	U	Perchloroethylene	3.80	5.77	
19	Bradley Pit	U	Perchloroethylene	6.50	8.38	
41	Bradley Pit	U	Perchloroethylene	0.08	0.11	
6	Bradley Pit	U	Perchloroethylene	2.10	2.85	
6	Bradley Pit	U	Perchloroethylene	5.80	7.26	
6	Bradley Pit	U	Perchloroethylene	1.40	1.92	
7	Calabasas	Y	Perchloroethylene	6.60	10.1	29.2
7	Calabasas	Y	Perchloroethylene	25.0	45.1	
7	Calabasas	Y	Perchloroethylene	18.0	32.5	
13	Carson	U	Perchloroethylene	0.039	0.082	0.055
13	Carson	U	Perchloroethylene	0.028	0.039	
13	Carson	U	Perchloroethylene	0.033	0.044	
43	CBI1	U	Perchloroethylene	4.75	4.88	4.88
43	CBI10	U	Perchloroethylene	4.60	4.69	4.69
43	CBI11	U	Perchloroethylene	12.0	12.1	12.1
43	CBI12	U	Perchloroethylene	2.40	2.64	2.64
43	CBI13	U	Perchloroethylene	0.74	0.90	0.90
43	CBI14	U	Perchloroethylene	14.9	15.1	15.1
43	CBI15	U	Perchloroethylene	0.23	0.23	0.23
43	CBI16	Y	Perchloroethylene	0.30	0.30	0.30
43	CBI17	U	Perchloroethylene	0.90	0.91	0.91
43	CBI18	U	Perchloroethylene	5.63	5.74	5.74
43	CBI19	U	Perchloroethylene	0.25	0.25	0.25
43	CBI2	U	Perchloroethylene	0.40	0.40	0.40
43	CBI20	U	Perchloroethylene	12.3	12.3	12.3
43	CBI21	U	Perchloroethylene	7.10	7.16	7.16
43	CBI22	U	Perchloroethylene	3.70	3.73	3.73
43	CBI23	U	Perchloroethylene	11.0	11.7	11.7
43	CBI24	Y	Perchloroethylene	12.6	12.8	12.8
43	CBI25	U	Perchloroethylene	8.20	8.27	8.27
43	CBI26	U	Perchloroethylene	0.40	0.40	0.40
43	CBI27	U	Perchloroethylene	2.63	2.65	2.65
43	CBI3	U	Perchloroethylene	0.10	0.10	0.10
43	CBI30	U	Perchloroethylene	6.82	6.88	6.88
43	CBI31	U	Perchloroethylene	3.80	3.81	3.81

Summary Statistics of Site Averages (ppmv)

Pentane	
Mean	9.753
Median	3.286
Standard Deviation	14.885
Variance	221.558
Kurtosis	2.996
Skewness	1.959
Range	46.462
Minimum	0.396
Maximum	46.858
Sum	165.793
Count	17.000
Normality Test (p)	<.01

Perchloroethylene	
Mean	8.764
Median	3.734
Standard Deviation	14.360
Variance	206.200
Kurtosis	10.513
Skewness	3.228
Range	65.463
Minimum	0.011
Maximum	65.474
Sum	517.077
Count	59.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
43	CBI32	U	Perchloroethylene	1.00	1.01	1.01
43	CBI33	U	Perchloroethylene	1.53	1.53	1.53
43	CBI4	U	Perchloroethylene	12.1	12.7	12.7
43	CBI5	U	Perchloroethylene	10.5	10.6	10.6
43	CBI6	U	Perchloroethylene	0.95	0.96	0.96
43	CBI7	U	Perchloroethylene	7.75	7.94	7.94
43	CBI8	U	Perchloroethylene	65.0	65.5	65.5
43	CBI9	U	Perchloroethylene	9.30	9.39	9.39
55	Chicopee	U	Perchloroethylene	1.59	2.04	2.04
56	Coyote Canyon	U	Perchloroethylene	5.31	7.07	8.75
56	Coyote Canyon	U	Perchloroethylene	5.12	6.82	
56	Coyote Canyon	U	Perchloroethylene	4.73	6.30	
56	Coyote Canyon	U	Perchloroethylene	4.86	7.20	
56	Coyote Canyon	U	Perchloroethylene	7.91	11.53	
56	Coyote Canyon	U	Perchloroethylene	9.18	13.6	
57	Durham Rd.	U	Perchloroethylene	7.60	10.0	10.2
57	Durham Rd.	U	Perchloroethylene	8.20	9.88	
57	Durham Rd.	U	Perchloroethylene	9.10	10.8	
41	Guadalupe	U	Perchloroethylene	54.4	65.1	65.1
27	Lyon Development	U	Perchloroethylene	2.90	3.41	2.90
27	Lyon Development	U	Perchloroethylene	4.40	5.24	
27	Lyon Development	U	Perchloroethylene	0.040	0.040	
10	Mission Canyon	N	Perchloroethylene	0.0026	0.011	0.01
5	Mountaingate	N	Perchloroethylene	1.00	2.89	2.89
5	Mountaingate	N	Perchloroethylene	1.10	3.18	3.18
5	Mountaingate	N	Perchloroethylene	0.91	2.61	2.61
5	Mountaingate	N	Perchloroethylene	1.10	3.16	3.16
8	Operating Industries	U	Perchloroethylene	0.27	0.54	0.54
58	Otay Annex	U	Perchloroethylene	2.94	3.18	3.18
84	Otay Landfill	Y	Perchloroethylene	3.47	4.71	4.71
22	Palos Verdes	Y	Perchloroethylene	0.16	0.70	2.60
22	Palos Verdes	Y	Perchloroethylene	0.42	1.83	
22	Palos Verdes	Y	Perchloroethylene	0.22	0.96	
22	Palos Verdes	Y	Perchloroethylene	0.34	1.48	
22	Palos Verdes	Y	Perchloroethylene	0.69	3.01	
22	Palos Verdes	Y	Perchloroethylene	0.49	2.14	
22	Palos Verdes	Y	Perchloroethylene	0.34	1.48	
22	Palos Verdes	Y	Perchloroethylene	0.15	0.65	
22	Palos Verdes	Y	Perchloroethylene	0.42	1.83	
22	Palos Verdes	Y	Perchloroethylene	0.57	2.49	
22	Palos Verdes	Y	Perchloroethylene	0.09	0.41	
22	Palos Verdes	Y	Perchloroethylene	0.52	2.27	
51	Palos Verdes	Y	Perchloroethylene	3.40	10.8	
51	Palos Verdes	Y	Perchloroethylene	2.50	6.39	
20	Penrose	U	Perchloroethylene	1.50	1.92	2.79
20	Penrose	U	Perchloroethylene	1.60	2.02	
20	Penrose	U	Perchloroethylene	3.00	5.16	
20	Penrose	U	Perchloroethylene	3.20	5.45	
20	Penrose	U	Perchloroethylene	0.91	2.21	
20	Penrose	U	Perchloroethylene	0.97	2.29	
20	Penrose	U	Perchloroethylene	0.64	1.27	
20	Penrose	U	Perchloroethylene	1.00	1.95	
18	Puente Hills	N	Perchloroethylene	7.90	10.3	24.25
18	Puente Hills	N	Perchloroethylene	8.50	11.5	
18	Puente Hills	N	Perchloroethylene	7.40	9.87	
18	Puente Hills	N	Perchloroethylene	5.90	7.81	
24	Puente Hills	N	Perchloroethylene	8.80	12.7	
24	Puente Hills	N	Perchloroethylene	0.94	1.30	
50	Puente Hills	N	Perchloroethylene	96.0	116	
59	Rockingham	U	Perchloroethylene	9.00	12.0	12.0
1	Scholl Canyon	N	Perchloroethylene	2.80	4.49	4.65
1	Scholl Canyon	N	Perchloroethylene	2.10	4.81	
9	Sheldon Street	U	Perchloroethylene	0.02	0.03	2.09
9	Sheldon Street	U	Perchloroethylene	4.10	8.16	
9	Sheldon Street	U	Perchloroethylene	0.04	0.08	
9	Sheldon Street	U	Perchloroethylene	0.04	0.08	
60	Sunshine Canyon	U	Perchloroethylene	13.0	13.7	13.7
23	Toyon Canyon	N	Perchloroethylene	0.98	1.05	1.05
43	CBI11	U	Propane	86.5	87.5	87.5
43	CBI13	U	Propane	9.76	11.8	11.8
43	CBI14	U	Propane	48.8	49.4	49.4
43	CBI16	Y	Propane	5.20	5.28	5.28
43	CBI17	U	Propane	7.00	7.07	7.07
43	CBI18	U	Propane	4.67	4.77	4.77
43	CBI19	U	Propane	6.50	6.53	6.53
43	CBI24	Y	Propane	4.26	4.33	4.33
43	CBI25	U	Propane	18.2	18.3	18.3
43	CBI26	U	Propane	11.0	11.1	11.1
43	CBI27	U	Propane	1.40	1.41	1.41
43	CBI30	U	Propane	13.1	13.2	13.2
43	CBI32	U	Propane	6.50	6.53	6.53

Summary Statistics of Site Averages (ppmv)

Propane	
Mean	21.185
Median	11.055
Standard Deviation	24.021
Variance	577.005
Kurtosis	1.836
Skewness	1.552
Range	86.831
Minimum	0.631
Maximum	87.462
Sum	444.877
Count	21.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
43	CBI33	U	Propane	0.63	0.63	0.63		
43	CBI34	U	Propane	2.50	2.51	2.51		
43	CBI4	U	Propane	43.6	45.8	45.8		
43	CBI5	U	Propane	32.0	32.3	32.3		
43	CBI6	U	Propane	36.5	36.8	36.8		
43	CBI8	U	Propane	25.3	25.5	25.5		
43	CBI9	U	Propane	68.0	68.7	68.7		
41	Guadalupe	U	Propane	4.60	5.51	5.51		
60	Sunshine Canyon	U	Propyl mercaptan	0.25	0.26	0.26		
41	Guadalupe	U	Propylester acetic acid	34.0	40.7	40.7		
41	Guadalupe	U	Propylester butanoic acid	86.6	104	104		
19	Bradley Pit	U	t-1,2-Dichloroethene	12.0	15.5	7.89	t-1,2-Dichloroethene	
19	Bradley Pit	U	t-1,2-Dichloroethene	9.30	11.8		Mean	7.090
19	Bradley Pit	U	t-1,2-Dichloroethene	2.40	3.64		Median	2.839
19	Bradley Pit	U	t-1,2-Dichloroethene	11.0	13.6		Standard Deviation	15.810
6	Bradley Pit	U	t-1,2-Dichloroethene	1.30	1.78		Variance	249.957
6	Bradley Pit	U	t-1,2-Dichloroethene	0.60	0.82		Kurtosis	27.561
6	Bradley Pit	U	t-1,2-Dichloroethene	6.40	8.01		Skewness	5.009
7	Calabasas	Y	t-1,2-Dichloroethene	52.0	93.9	93.9	Range	93.752
43	CBI10	U	t-1,2-Dichloroethene	6.20	6.32	6.32	Minimum	0.111
43	CBI11	U	t-1,2-Dichloroethene	18.5	18.7	18.7	Maximum	93.863
43	CBI12	U	t-1,2-Dichloroethene	5.27	5.81	5.81	Sum	255.256
43	CBI13	U	t-1,2-Dichloroethene	0.13	0.16	0.16	Count	36.000
43	CBI14	U	t-1,2-Dichloroethene	8.58	8.68	8.68	Normality Test (p)	<.01
43	CBI15	U	t-1,2-Dichloroethene	0.83	0.84	0.84		
43	CBI17	U	t-1,2-Dichloroethene	1.65	1.67	1.67		
43	CBI18	U	t-1,2-Dichloroethene	7.82	7.98	7.98		
43	CBI19	U	t-1,2-Dichloroethene	0.30	0.30	0.30		
43	CBI2	U	t-1,2-Dichloroethene	0.25	0.25	0.25		
43	CBI20	U	t-1,2-Dichloroethene	5.45	5.48	5.48		
43	CBI21	U	t-1,2-Dichloroethene	2.78	2.80	2.80		
43	CBI22	U	t-1,2-Dichloroethene	6.23	6.29	6.29		
43	CBI23	U	t-1,2-Dichloroethene	13.00	13.80	13.8		
43	CBI24	Y	t-1,2-Dichloroethene	4.55	4.62	4.62		
43	CBI26	U	t-1,2-Dichloroethene	0.50	0.50	0.50		
43	CBI27	U	t-1,2-Dichloroethene	3.93	3.96	3.96		
43	CBI28	U	t-1,2-Dichloroethene	1.20	1.20	1.20		
43	CBI29	U	t-1,2-Dichloroethene	11.49	12.16	12.2		
43	CBI3	U	t-1,2-Dichloroethene	0.60	0.60	0.60		
43	CBI30	U	t-1,2-Dichloroethene	0.11	0.11	0.11		
43	CBI31	U	t-1,2-Dichloroethene	8.80	8.82	8.82		
43	CBI32	U	t-1,2-Dichloroethene	1.20	1.21	1.21		
43	CBI33	U	t-1,2-Dichloroethene	2.87	2.88	2.88		
43	CBI34	U	t-1,2-Dichloroethene	0.50	0.50	0.50		
43	CBI5	U	t-1,2-Dichloroethene	7.35	7.42	7.42		
43	CBI6	U	t-1,2-Dichloroethene	0.90	0.91	0.91		
43	CBI7	U	t-1,2-Dichloroethene	1.35	1.38	1.38		
43	CBI8	U	t-1,2-Dichloroethene	1.30	1.31	1.31		
43	CBI9	U	t-1,2-Dichloroethene	0.90	0.91	0.91		
27	Lyon Development	U	t-1,2-Dichloroethene	0.20	0.24	0.26		
27	Lyon Development	U	t-1,2-Dichloroethene	0.41	0.49			
27	Lyon Development	U	t-1,2-Dichloroethene	0.060	0.060			
5	Mountaingate	N	t-1,2-Dichloroethene	0.080	0.23	0.23		
5	Mountaingate	N	t-1,2-Dichloroethene	0.080	0.23			
5	Mountaingate	N	t-1,2-Dichloroethene	0.080	0.23			
5	Mountaingate	N	t-1,2-Dichloroethene	0.080	0.23			
20	Penrose	U	t-1,2-Dichloroethene	1.50	1.92	2.90		
20	Penrose	U	t-1,2-Dichloroethene	1.50	1.90			
20	Penrose	U	t-1,2-Dichloroethene	1.50	2.58			
20	Penrose	U	t-1,2-Dichloroethene	1.50	2.56			
20	Penrose	U	t-1,2-Dichloroethene	1.50	3.65			
20	Penrose	U	t-1,2-Dichloroethene	1.50	3.55			
20	Penrose	U	t-1,2-Dichloroethene	1.80	3.58			
20	Penrose	U	t-1,2-Dichloroethene	1.80	3.51			
18	Puente Hills	N	t-1,2-Dichloroethene	17.0	22.1	22.5		
18	Puente Hills	N	t-1,2-Dichloroethene	17.0	22.9			
18	Puente Hills	N	t-1,2-Dichloroethene	17.0	22.7			
18	Puente Hills	N	t-1,2-Dichloroethene	17.0	22.5			
41	Guadalupe	U	Tetrahydrofuran	3.40	4.07	4.07		
41	Guadalupe	U	Thiobismethane	10.6	12.7	12.7		
54	Arbor Hills	U	Toluene	69.5	71.1	70.1	Toluene (co-disposal)	
54	Arbor Hills	U	Toluene	69.7	70.3		Mean	165.110
54	Arbor Hills	U	Toluene	67.6	68.9		Median	127.201
15	Azusa Land Reclamation	U	Toluene	21.0	21.9	38.1	Standard Deviation	151.996
15	Azusa Land Reclamation	U	Toluene	45.0	46.9		Variance	23102.706
15	Azusa Land Reclamation	U	Toluene	29.0	30.2		Kurtosis	-1.195
15	Azusa Land Reclamation	U	Toluene	32.0	33.4		Skewness	0.676
15	Azusa Land Reclamation	U	Toluene	53.0	55.3		Range	362.938
15	Azusa Land Reclamation	U	Toluene	46.0	48.0		Minimum	17.462
15	Azusa Land Reclamation	U	Toluene	44.0	45.9		Maximum	380.400
15	Azusa Land Reclamation	U	Toluene	28.0	29.2		Sum	825.551

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)
15	Azusa Land Reclamation	U	Toluene	31.0	32.3	
12	BKK Landfill	Y	Toluene	180	396	380
12	BKK Landfill	Y	Toluene	130	305	
12	BKK Landfill	Y	Toluene	200	440	
17	Bradley Pit	U	Toluene	34.0	50.8	26.3
17	Bradley Pit	U	Toluene	30.0	46.2	
17	Bradley Pit	U	Toluene	15.0	18.8	
17	Bradley Pit	U	Toluene	14.0	17.5	
17	Bradley Pit	U	Toluene	24.0	29.7	
17	Bradley Pit	U	Toluene	24.0	29.0	
41	Bradley Pit	U	Toluene	4.50	6.50	
6	Bradley Pit	U	Toluene	5.80	7.95	
6	Bradley Pit	U	Toluene	26.0	32.5	
6	Bradley Pit	U	Toluene	18.0	24.5	
7	Calabasas	Y	Toluene	196	299	256
7	Calabasas	Y	Toluene	110	199	
7	Calabasas	Y	Toluene	150	271	
13	Carson	U	Toluene	24.0	50.4	30.4
13	Carson	U	Toluene	14.0	19.3	
13	Carson	U	Toluene	16.0	21.4	
43	CBI1	U	Toluene	70.8	72.8	72.8
43	CBI10	U	Toluene	31.5	32.1	32.1
43	CBI11	U	Toluene	40.0	40.4	40.4
43	CBI12	U	Toluene	28.2	31.1	31.1
43	CBI13	U	Toluene	35.5	43.0	43.0
43	CBI14	U	Toluene	60.9	61.6	61.6
43	CBI15	U	Toluene	1.45	1.46	1.46
43	CBI16	Y	Toluene	17.2	17.5	17.5
43	CBI17	U	Toluene	3.00	3.03	3.03
43	CBI18	U	Toluene	77.2	78.7	78.7
43	CBI19	U	Toluene	2.10	2.11	2.11
43	CBI2	U	Toluene	2.50	2.52	2.52
43	CBI20	U	Toluene	47.5	47.8	47.8
43	CBI21	U	Toluene	19.4	19.5	19.5
43	CBI22	U	Toluene	23.3	23.5	23.5
43	CBI23	U	Toluene	37.0	39.3	39.3
43	CBI24	Y	Toluene	125	127	127
43	CBI25	U	Toluene	221	223	223
43	CBI26	U	Toluene	5.85	5.88	5.88
43	CBI27	U	Toluene	13.9	14.0	14.0
43	CBI28	U	Toluene	1.05	1.05	1.05
43	CBI29	U	Toluene	347	367	367
43	CBI3	U	Toluene	19.0	19.0	19.0
43	CBI30	U	Toluene	123	124	124
43	CBI31	U	Toluene	53.0	53.1	53.1
43	CBI32	U	Toluene	12.7	12.8	12.8
43	CBI33	U	Toluene	27.2	27.3	27.3
43	CBI34	U	Toluene	0.85	0.85	0.85
43	CBI4	U	Toluene	37.9	39.8	39.8
43	CBI5	U	Toluene	43.5	43.9	43.9
43	CBI6	U	Toluene	10.1	10.1	10.1
43	CBI7	U	Toluene	68.5	70.2	70.2
43	CBI8	U	Toluene	51.0	51.4	51.4
43	CBI9	U	Toluene	30.0	30.3	30.3
55	Chicopee	U	Toluene	119	153	153
56	Coyote Canyon	U	Toluene	57.5	76.6	84.7
56	Coyote Canyon	U	Toluene	59.8	79.6	
56	Coyote Canyon	U	Toluene	59.3	79.0	
56	Coyote Canyon	U	Toluene	60.4	89.5	
56	Coyote Canyon	U	Toluene	59.8	87.2	
56	Coyote Canyon	U	Toluene	65.2	96.4	
41	Guadalupe	U	Toluene	160	192	192
27	Lyon Development	U	Toluene	32.0	37.6	21.8
27	Lyon Development	U	Toluene	23.0	27.4	
27	Lyon Development	U	Toluene	0.40	0.40	
10	Mission Canyon	N	Toluene	0.05	0.20	0.20
5	Mountaingate	N	Toluene	1.90	5.49	6.27
5	Mountaingate	N	Toluene	1.80	5.20	
5	Mountaingate	N	Toluene	1.90	5.46	
5	Mountaingate	N	Toluene	3.10	8.91	
8	Operating Industries	U	Toluene	56	112	112
22	Palos Verdes	Y	Toluene	1.00	4.36	44.5
22	Palos Verdes	Y	Toluene	9.50	41.4	
22	Palos Verdes	Y	Toluene	1.00	4.36	
22	Palos Verdes	Y	Toluene	4.30	18.7	
22	Palos Verdes	Y	Toluene	1.10	4.80	
22	Palos Verdes	Y	Toluene	5.50	24.0	
22	Palos Verdes	Y	Toluene	12.0	52.3	
22	Palos Verdes	Y	Toluene	19.0	82.8	
22	Palos Verdes	Y	Toluene	3.90	17.0	
22	Palos Verdes	Y	Toluene	9.50	41.4	

Summary Statistics of Site Averages (ppmv)

Count	5.000
Normality Test (p)	>.20

Toluene (unknown & no co-disp.)

Mean	59.147
Median	39.282
Standard Deviation	69.941
Variance	4891.701
Kurtosis	7.016
Skewness	2.364
Range	366.698
Minimum	0.198
Maximum	366.896
Sum	3016.507
Count	51.000
Normality Test (p)	<.01

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
22	Palos Verdes	Y	Toluene	1.00	4.36			
22	Palos Verdes	Y	Toluene	19.0	82.8			
51	Palos Verdes	Y	Toluene	22.0	70.1			
51	Palos Verdes	Y	Toluene	68.0	174			
20	Penrose	U	Toluene	22.0	28.2	49.8		
20	Penrose	U	Toluene	21.0	26.5			
20	Penrose	U	Toluene	42.0	72.3			
20	Penrose	U	Toluene	68.0	116			
20	Penrose	U	Toluene	14.0	34.1			
20	Penrose	U	Toluene	15.0	35.5			
20	Penrose	U	Toluene	16.0	31.8			
20	Penrose	U	Toluene	28.0	54.6			
18	Puente Hills	N	Toluene	180	234	212		
18	Puente Hills	N	Toluene	190	256			
18	Puente Hills	N	Toluene	240	320			
18	Puente Hills	N	Toluene	230	305			
24	Puente Hills	N	Toluene	57.5	83.0			
24	Puente Hills	N	Toluene	55.5	76.9			
50	Puente Hills	N	Toluene	100	121	121		
59	Rockingham	U	Toluene	99	132	132		
1	Scholl Canyon	N	Toluene	47.0	75.4	46.3		
1	Scholl Canyon	N	Toluene	7.50	17.2			
9	Sheldon Street	U	Toluene	20.0	39.8	14.1		
9	Sheldon Street	U	Toluene	0.54	1.07			
9	Sheldon Street	U	Toluene	3.90	7.76			
9	Sheldon Street	U	Toluene	3.90	7.76			
60	Sunshine Canyon	U	Toluene	100	105	105		
23	Toyon Canyon	N	Toluene	8.40	9.03	9.03		
53	Altamont	U	Trichloroethene	6.90	8.31	4.95	Trichloroethene	
53	Altamont	U	Trichloroethene	3.10	3.60		Mean	4.270
53	Altamont	U	Trichloroethene	5.00	5.92	5.92	Median	2.824
53	Arbor Hills	U	Trichloroethene	4.37	4.47	4.24	Standard Deviation	5.630
53	Arbor Hills	U	Trichloroethene	4.14	4.18		Variance	31.698
53	Arbor Hills	U	Trichloroethene	4.00	4.08		Kurtosis	8.287
53	Arbor Hills	U	Trichloroethene	4.17	4.44	4.44	Skewness	2.781
15	Azusa Land Reclamation	U	Trichloroethene	4.30	4.48	3.72	Range	28.660
15	Azusa Land Reclamation	U	Trichloroethene	3.40	3.55		Minimum	0.026
15	Azusa Land Reclamation	U	Trichloroethene	8.90	9.28		Maximum	28.685
15	Azusa Land Reclamation	U	Trichloroethene	3.30	3.44		Sum	243.378
15	Azusa Land Reclamation	U	Trichloroethene	3.50	3.65		Count	57.000
15	Azusa Land Reclamation	U	Trichloroethene	0.79	0.82		Normality Test (p)	<.01
15	Azusa Land Reclamation	U	Trichloroethene	3.60	3.75			
15	Azusa Land Reclamation	U	Trichloroethene	3.70	3.86			
15	Azusa Land Reclamation	U	Trichloroethene	0.59	0.62			
12	BKK Landfill	Y	Trichloroethene	13.0	28.6	28.7		
12	BKK Landfill	Y	Trichloroethene	4.80	11.3			
12	BKK Landfill	Y	Trichloroethene	21.0	46.2			
17	Bradley Pit	U	Trichloroethene	5.90	7.30	5.15		
17	Bradley Pit	U	Trichloroethene	2.40	3.00			
17	Bradley Pit	U	Trichloroethene	1.90	2.38			
17	Bradley Pit	U	Trichloroethene	6.20	7.49			
17	Bradley Pit	U	Trichloroethene	6.50	9.72			
17	Bradley Pit	U	Trichloroethene	5.50	8.46			
19	Bradley Pit	U	Trichloroethene	4.90	6.47			
19	Bradley Pit	U	Trichloroethene	4.90	6.24			
19	Bradley Pit	U	Trichloroethene	1.60	2.43			
19	Bradley Pit	U	Trichloroethene	4.60	5.71			
6	Bradley Pit	U	Trichloroethene	5.10	6.57			
6	Bradley Pit	U	Trichloroethene	0.20	0.29			
6	Bradley Pit	U	Trichloroethene	3.70	4.63			
6	Bradley Pit	U	Trichloroethene	1.00	1.36			
7	Calabasas	Y	Trichloroethene	0.69	0.95	14.8		
7	Calabasas	Y	Trichloroethene	12.0	21.7			
7	Calabasas	Y	Trichloroethene	12.0	21.7			
13	Carson	U	Trichloroethene	0.17	0.23	0.28		
13	Carson	U	Trichloroethene	0.16	0.22			
13	Carson	U	Trichloroethene	0.19	0.40			
43	CBI10	U	Trichloroethene	3.25	3.31	3.31		
43	CBI11	U	Trichloroethene	21.5	21.7	21.7		
43	CBI12	U	Trichloroethene	1.54	1.70	1.70		
43	CBI13	U	Trichloroethene	0.22	0.27	0.27		
43	CBI14	U	Trichloroethene	6.96	7.04	7.04		
43	CBI15	U	Trichloroethene	0.18	0.18	0.18		
43	CBI16	Y	Trichloroethene	0.30	0.30	0.30		
43	CBI17	U	Trichloroethene	0.40	0.40	0.40		
43	CBI18	U	Trichloroethene	5.23	5.34	5.34		
43	CBI19	U	Trichloroethene	0.15	0.15	0.15		
43	CBI2	U	Trichloroethene	0.20	0.20	0.20		
43	CBI20	U	Trichloroethene	3.75	3.77	3.77		
43	CBI21	U	Trichloroethene	1.38	1.39	1.39		
43	CBI22	U	Trichloroethene	1.63	1.64	1.64		

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
43	CBI23	U	Trichloroethene	3.10	3.29	3.29		
43	CBI24	Y	Trichloroethene	13.0	13.2	13.2		
43	CBI25	U	Trichloroethene	7.85	7.91	7.91		
43	CBI26	U	Trichloroethene	0.20	0.20	0.20		
43	CBI27	U	Trichloroethene	1.67	1.68	1.68		
43	CBI30	U	Trichloroethene	2.02	2.04	2.04		
43	CBI31	U	Trichloroethene	1.80	1.80	1.80		
43	CBI32	U	Trichloroethene	1.55	1.56	1.56		
43	CBI33	U	Trichloroethene	0.50	0.50	0.50		
43	CBI4	U	Trichloroethene	1.14	1.20	1.20		
43	CBI5	U	Trichloroethene	3.05	3.08	3.08		
43	CBI6	U	Trichloroethene	0.45	0.45	0.45		
43	CBI7	U	Trichloroethene	4.70	4.82	4.82		
43	CBI8	U	Trichloroethene	7.80	7.86	7.86		
43	CBI9	U	Trichloroethene	3.40	3.43	3.43		
55	Chicopee	U	Trichloroethene	2.20	2.82	2.82		
56	Coyote Canyon	U	Trichloroethene	2.38	3.17	3.64		
56	Coyote Canyon	U	Trichloroethene	2.23	2.97			
56	Coyote Canyon	U	Trichloroethene	2.47	3.29			
56	Coyote Canyon	U	Trichloroethene	2.37	3.51			
56	Coyote Canyon	U	Trichloroethene	3.01	4.39			
56	Coyote Canyon	U	Trichloroethene	3.06	4.53			
57	Durham Rd.	U	Trichloroethene	2.50	3.29	3.21		
57	Durham Rd.	U	Trichloroethene	2.60	3.13			
57	Durham Rd.	U	Trichloroethene	2.70	3.21			
57	Durham Rd.	U	Trichloroethene	2.60	3.19	3.19		
41	Guadalupe	U	Trichloroethene	18.7	22.4	22.4		
27	Lyon Development	U	Trichloroethene	2.60	3.06	2.14		
27	Lyon Development	U	Trichloroethene	2.80	3.33			
27	Lyon Development	U	Trichloroethene	0.040	0.040			
10	Mission Canyon	N	Trichloroethene	0.0062	0.026	0.026		
5	Mountaingate	N	Trichloroethene	0.54	1.55	1.72		
5	Mountaingate	N	Trichloroethene	0.62	1.79			
5	Mountaingate	N	Trichloroethene	0.60	1.73			
5	Mountaingate	N	Trichloroethene	0.63	1.81			
8	Operating Industries	U	Trichloroethene	1.20	2.39	2.39		
58	Otay Annex	U	Trichloroethene	2.09	2.84	2.84		
84	Otay Landfill	Y	Trichloroethene	3.23	3.49	3.49		
22	Palos Verdes	Y	Trichloroethene	0.36	1.57	1.38		
22	Palos Verdes	Y	Trichloroethene	0.29	1.26			
22	Palos Verdes	Y	Trichloroethene	0.32	1.40			
22	Palos Verdes	Y	Trichloroethene	0.31	1.35			
22	Palos Verdes	Y	Trichloroethene	0.36	1.57			
22	Palos Verdes	Y	Trichloroethene	0.28	1.22			
22	Palos Verdes	Y	Trichloroethene	0.20	0.87			
22	Palos Verdes	Y	Trichloroethene	0.19	0.83			
22	Palos Verdes	Y	Trichloroethene	0.29	1.26			
22	Palos Verdes	Y	Trichloroethene	0.15	0.65			
22	Palos Verdes	Y	Trichloroethene	0.34	1.48			
22	Palos Verdes	Y	Trichloroethene	0.09	0.38			
51	Palos Verdes	Y	Trichloroethene	0.91	2.33			
51	Palos Verdes	Y	Trichloroethene	0.98	3.12			
20	Penrose	U	Trichloroethene	1.20	1.54	1.97		
20	Penrose	U	Trichloroethene	1.30	1.64			
20	Penrose	U	Trichloroethene	1.90	3.27			
20	Penrose	U	Trichloroethene	2.00	3.41			
20	Penrose	U	Trichloroethene	0.65	1.58			
20	Penrose	U	Trichloroethene	0.68	1.61			
20	Penrose	U	Trichloroethene	0.61	1.21			
20	Penrose	U	Trichloroethene	0.75	1.46			
18	Puente Hills	N	Trichloroethene	3.90	5.06	6.36		
18	Puente Hills	N	Trichloroethene	4.30	5.80			
18	Puente Hills	N	Trichloroethene	4.30	5.73			
18	Puente Hills	N	Trichloroethene	3.60	4.77			
24	Puente Hills	N	Trichloroethene	4.40	6.35			
24	Puente Hills	N	Trichloroethene	0.75	1.03			
50	Puente Hills	N	Trichloroethene	13.0	15.8			
59	Rockingham	U	Trichloroethene	5.30	7.05	7.05		
1	Scholl Canyon	N	Trichloroethene	2.10	3.37	1.90		
1	Scholl Canyon	N	Trichloroethene	0.19	0.43			
9	Sheldon Street	U	Trichloroethene	0.19	0.38	0.80		
9	Sheldon Street	U	Trichloroethene	0.04	0.07		Vinyl chloride	
9	Sheldon Street	U	Trichloroethene	0.19	0.38		Mean	13.690
9	Sheldon Street	U	Trichloroethene	1.20	2.39		Median	7.340
60	Sunshine Canyon	U	Trichloroethene	2.40	2.53	2.53	Standard Deviation	31.266
23	Toyon Canyon	N	Trichloroethene	0.86	0.92	0.92	Variance	977.548
10	Mission Canyon	N	Vinyl chloride	0.05	0.22	0.22	Kurtosis	42.232
5	Mountaingate	N	Vinyl chloride	4.40	12.6	12.5	Skewness	6.241
5	Mountaingate	N	Vinyl chloride	4.40	12.7		Range	225.215
5	Mountaingate	N	Vinyl chloride	4.20	12.1		Minimum	0.129
5	Mountaingate	N	Vinyl chloride	4.40	12.6		Maximum	225.344

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
18	Puente Hills	N	Vinyl chloride	18.0	23.4	16.7	Sum	725.545
18	Puente Hills	N	Vinyl chloride	18.0	24.3		Count	53.000
18	Puente Hills	N	Vinyl chloride	15.0	20.0		Normality Test (p)	<.01
18	Puente Hills	N	Vinyl chloride	14.0	18.5			
24	Puente Hills	N	Vinyl chloride	6.80	9.81			
24	Puente Hills	N	Vinyl chloride	6.70	9.28			
50	Puente Hills	N	Vinyl chloride	9.40	11.4			
1	Scholl Canyon	N	Vinyl chloride	6.70	10.8	10.1		
1	Scholl Canyon	N	Vinyl chloride	4.10	9.38			
23	Toyon Canyon	N	Vinyl chloride	0.12	0.13	0.13		
53	Altamont	U	Vinyl Chloride	55.0	66.3	52.3		
53	Altamont	U	Vinyl Chloride	33.0	38.4			
54	Arbor Hills	U	Vinyl Chloride	6.58	6.73	6.70		
54	Arbor Hills	U	Vinyl Chloride	6.58	6.64			
54	Arbor Hills	U	Vinyl Chloride	6.61	6.74			
15	Azusa Land Reclamation	U	Vinyl chloride	2.80	2.92	2.25		
15	Azusa Land Reclamation	U	Vinyl chloride	2.90	3.02			
15	Azusa Land Reclamation	U	Vinyl chloride	2.80	2.92			
15	Azusa Land Reclamation	U	Vinyl chloride	0.00	0.00			
15	Azusa Land Reclamation	U	Vinyl chloride	2.80	2.92			
15	Azusa Land Reclamation	U	Vinyl chloride	1.10	1.15			
15	Azusa Land Reclamation	U	Vinyl chloride	1.10	1.15			
15	Azusa Land Reclamation	U	Vinyl chloride	2.50	2.61			
15	Azusa Land Reclamation	U	Vinyl chloride	2.80	2.92			
15	Azusa Land Reclamation	U	Vinyl chloride	2.80	2.92			
17	Bradley Pit	U	Vinyl chloride	13.00	17.13	12.44		
17	Bradley Pit	U	Vinyl chloride	2.30	3.03			
17	Bradley Pit	U	Vinyl chloride	11.00	14.49			
17	Bradley Pit	U	Vinyl chloride	11.00	14.49			
17	Bradley Pit	U	Vinyl chloride	4.00	5.27			
17	Bradley Pit	U	Vinyl chloride	4.00	5.27			
17	Bradley Pit	U	Vinyl chloride	13.00	17.13			
17	Bradley Pit	U	Vinyl chloride	11.00	14.49			
17	Bradley Pit	U	Vinyl chloride	13.00	17.13			
19	Bradley Pit	U	Vinyl chloride	20.0	25.5			
19	Bradley Pit	U	Vinyl chloride	3.40	5.16			
19	Bradley Pit	U	Vinyl chloride	13.0	16.1			
19	Bradley Pit	U	Vinyl chloride	11.0	14.2			
6	Bradley Pit	U	Vinyl chloride	0.80	1.16			
6	Bradley Pit	U	Vinyl chloride	22.0	27.5			
6	Bradley Pit	U	Vinyl chloride	5.00	6.79			
6	Bradley Pit	U	Vinyl chloride	4.80	6.58			
13	Carson	U	Vinyl chloride	4.90	6.74	6.52		
13	Carson	U	Vinyl chloride	4.70	6.29			
43	CBI10	U	Vinyl chloride	2.05	2.09	2.09		
43	CBI11	U	Vinyl chloride	19.0	19.2	19.2		
43	CBI12	U	Vinyl chloride	8.43	9.29	9.29		
43	CBI13	U	Vinyl chloride	9.98	12.08	12.08		
43	CBI14	U	Vinyl chloride	6.11	6.18	6.18		
43	CBI15	U	Vinyl chloride	2.70	2.73	2.73		
43	CBI17	U	Vinyl chloride	11.4	11.5	11.5		
43	CBI18	U	Vinyl chloride	10.9	11.1	11.1		
43	CBI19	U	Vinyl chloride	1.95	1.96	1.96		
43	CBI2	U	Vinyl chloride	0.40	0.40	0.40		
43	CBI20	U	Vinyl chloride	7.60	7.65	7.65		
43	CBI21	U	Vinyl chloride	15.0	15.1	15.1		
43	CBI22	U	Vinyl chloride	4.93	4.97	4.97		
43	CBI23	U	Vinyl chloride	13.0	13.8	13.8		
43	CBI25	U	Vinyl chloride	15.2	15.3	15.3		
43	CBI26	U	Vinyl chloride	5.20	5.23	5.23		
43	CBI27	U	Vinyl chloride	12.4	12.5	12.5		
43	CBI3	U	Vinyl chloride	1.30	1.30	1.30		
43	CBI30	U	Vinyl chloride	5.61	5.66	5.66		
43	CBI32	U	Vinyl chloride	7.70	7.74	7.74		
43	CBI33	U	Vinyl chloride	14.4	14.4	14.4		
43	CBI34	U	Vinyl chloride	9.60	9.62	9.62		
43	CBI4	U	Vinyl chloride	2.65	2.78	2.78		
43	CBI5	U	Vinyl chloride	7.70	7.78	7.78		
43	CBI6	U	Vinyl chloride	3.25	3.27	3.27		
43	CBI7	U	Vinyl chloride	3.00	3.07	3.07		
43	CBI8	U	Vinyl chloride	3.83	3.86	3.86		
43	CBI9	U	Vinyl chloride	5.30	5.35	5.35		
55	Chicopee	U	Vinyl chloride	8.59	11.0	11.0		
56	Coyote Canyon	U	Vinyl chloride	1.90	2.53	2.62		
56	Coyote Canyon	U	Vinyl chloride	1.84	2.45			
56	Coyote Canyon	U	Vinyl chloride	1.83	2.44			
56	Coyote Canyon	U	Vinyl chloride	1.83	2.71			
56	Coyote Canyon	U	Vinyl chloride	1.85	2.70			
56	Coyote Canyon	U	Vinyl chloride	1.95	2.88			
57	Durham Rd.	U	Vinyl chloride	6.00	7.89	7.34		
357	Durham Rd.	U	Vinyl chloride	5.80	6.99			

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
57	Durham Rd.	U	Vinyl chloride	6.00	7.14			
27	Lyon Development	U	Vinyl chloride	0.87	1.02	2.68		
27	Lyon Development	U	Vinyl chloride	5.20	6.19			
27	Lyon Development	U	Vinyl chloride	0.84	0.83			
8	Operating Industries	U	Vinyl chloride	6.80	13.5	13.5		
58	Otay Annex	U	Vinyl chloride	2.40	3.26	3.26		
20	Penrose	U	Vinyl chloride	0.64	0.82	3.13		
20	Penrose	U	Vinyl chloride	0.46	0.58			
20	Penrose	U	Vinyl chloride	4.40	7.57			
20	Penrose	U	Vinyl chloride	4.60	7.84			
20	Penrose	U	Vinyl chloride	0.73	1.78			
20	Penrose	U	Vinyl chloride	0.65	1.54			
20	Penrose	U	Vinyl chloride	1.20	2.39			
20	Penrose	U	Vinyl chloride	1.30	2.53			
59	Rockingham	U	Vinyl chloride	22.4	29.8	29.8		
9	Sheldon Street	U	Vinyl chloride	0.08	0.16	1.28		
9	Sheldon Street	U	Vinyl chloride	0.25	0.50			
9	Sheldon Street	U	Vinyl chloride	0.25	0.50			
9	Sheldon Street	U	Vinyl chloride	2.00	3.98			
12	BKK Landfill	Y	Vinyl chloride	160	352	225		
12	BKK Landfill	Y	Vinyl chloride	77.0	181			
12	BKK Landfill	Y	Vinyl chloride	65.0	143			
7	Calabasas	Y	Vinyl chloride	22.8	34.8	46.5		
7	Calabasas	Y	Vinyl chloride	30.0	54.2			
7	Calabasas	Y	Vinyl chloride	28.0	50.5			
43	CBI16	Y	Vinyl chloride	1.00	1.02	1.02		
43	CBI24	Y	Vinyl chloride	16.9	17.2	17.2		
58	Otay Valley	Y	Vinyl chloride	16.4	17.7	17.7		
22	Palos Verdes	Y	Vinyl chloride	2.20	9.59	7.25		
22	Palos Verdes	Y	Vinyl chloride	2.20	9.59			
22	Palos Verdes	Y	Vinyl chloride	1.80	7.85			
22	Palos Verdes	Y	Vinyl chloride	2.20	9.59			
22	Palos Verdes	Y	Vinyl chloride	0.83	3.62			
22	Palos Verdes	Y	Vinyl chloride	1.80	7.85			
22	Palos Verdes	Y	Vinyl chloride	0.96	4.19			
22	Palos Verdes	Y	Vinyl chloride	2.10	9.16			
22	Palos Verdes	Y	Vinyl chloride	2.20	9.59			
22	Palos Verdes	Y	Vinyl chloride	0.59	2.57			
22	Palos Verdes	Y	Vinyl chloride	2.20	9.59			
22	Palos Verdes	Y	Vinyl chloride	1.30	5.67			
51	Palos Verdes	Y	Vinyl chloride	2.60	8.28			
51	Palos Verdes	Y	Vinyl chloride	1.70	4.35			
54	Arbor Hills	U	Vinylidene chloride	0.24	0.24	0.24	Vinylidene Chloride	
54	Arbor Hills	U	Vinylidene chloride	0.24	0.24		Mean	2.732
54	Arbor Hills	U	Vinylidene chloride	0.24	0.25		Median	0.201
17	Bradley Pit	U	Vinylidene chloride	32.0	42.2	18.6	Standard Deviation	8.163
17	Bradley Pit	U	Vinylidene chloride	9.80	12.9		Variance	66.634
17	Bradley Pit	U	Vinylidene chloride	9.30	12.3		Kurtosis	11.595
17	Bradley Pit	U	Vinylidene chloride	29.0	38.2		Skewness	3.417
17	Bradley Pit	U	Vinylidene chloride	2.30	3.03		Range	33.717
17	Bradley Pit	U	Vinylidene chloride	2.40	3.16		Minimum	0.055
43	CBI10	U	Vinylidene chloride	0.10	0.10	0.10	Maximum	33.772
43	CBI11	U	Vinylidene chloride	0.65	0.66	0.66	Sum	57.365
43	CBI12	U	Vinylidene chloride	0.05	0.06	0.06	Count	21.000
43	CBI13	U	Vinylidene chloride	0.08	0.10	0.10	Normality Test (p)	<.01
43	CBI14	U	Vinylidene chloride	0.23	0.23	0.23		
43	CBI17	U	Vinylidene chloride	0.15	0.15	0.15		
43	CBI18	U	Vinylidene chloride	0.18	0.18	0.18		
43	CBI20	U	Vinylidene chloride	0.20	0.20	0.20		
43	CBI21	U	Vinylidene chloride	0.43	0.43	0.43		
43	CBI24	Y	Vinylidene chloride	0.75	0.76	0.76		
43	CBI27	U	Vinylidene chloride	0.13	0.13	0.13		
43	CBI4	U	Vinylidene chloride	0.07	0.07	0.07		
43	CBI5	U	Vinylidene chloride	0.10	0.10	0.10		
43	CBI6	U	Vinylidene chloride	0.20	0.20	0.20		
43	CBI8	U	Vinylidene chloride	0.49	0.49	0.49		
43	CBI9	U	Vinylidene chloride	0.20	0.20	0.20		
55	Chicopee	U	Vinylidene chloride	0.12	0.15	0.15		
56	Coyote Canyon	U	Vinylidene chloride	0.34	0.46	0.49		
56	Coyote Canyon	U	Vinylidene chloride	0.33	0.44			
56	Coyote Canyon	U	Vinylidene chloride	0.37	0.49			
56	Coyote Canyon	U	Vinylidene chloride	0.36	0.53			
56	Coyote Canyon	U	Vinylidene chloride	0.36	0.52			
56	Coyote Canyon	U	Vinylidene chloride	0.36	0.53			
41	Guadalupe	U	Vinylidene chloride	28.2	33.8	33.8		
54	Arbor Hills	U	Xylenes	55.8	57.1	58.0	Xylenes	
54	Arbor Hills	U	Xylenes	63.8	64.4		Mean	28.939
54	Arbor Hills	U	Xylenes	51.4	52.4		Median	12.073
43	CBI1	U	Xylenes	4.66	4.79	4.79	Standard Deviation	38.811
43	CBI10	U	Xylenes	10.0	10.2	10.2	Variance	1506.274
43	CBI11	U	Xylenes	12.5	12.6	12.6	Kurtosis	5.457

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix B. Default LFG Constituent Concentrations

Reference	Landfill Name	Co-disposal (Y, N, or U)*	Compound	Raw Concentration (ppmv)	Air Infiltration Corrected Conc. (ppmv)	Site Avg.** (ppmv)	Summary Statistics of Site Averages (ppmv)	
43	CBI12	U	Xylenes	8.55	9.42	9.42	Skewness	2.166
43	CBI13	U	Xylenes	65.0	78.6	78.6	Range	181.617
43	CBI14	U	Xylenes	2.47	2.50	2.50	Minimum	0.400
43	CBI15	U	Xylenes	9.78	9.88	9.88	Maximum	182.017
43	CBI16	Y	Xylenes	2.90	2.94	2.94	Sum	1157.579
43	CBI17	U	Xylenes	0.45	0.45	0.45	Count	40.000
43	CBI18	U	Xylenes	15.3	15.6	15.6	Normality Test (p)	<.01
43	CBI19	U	Xylenes	0.45	0.45	0.45		
43	CBI2	U	Xylenes	1.30	1.31	1.31		
43	CBI20	U	Xylenes	37.5	37.7	37.7		
43	CBI21	U	Xylenes	0.50	0.50	0.50		
43	CBI22	U	Xylenes	13.3	13.5	13.5		
43	CBI23	U	Xylenes	12.0	12.7	12.7		
43	CBI24	Y	Xylenes	70.8	71.8	71.8		
43	CBI26	U	Xylenes	1.50	1.51	1.51		
43	CBI27	U	Xylenes	4.63	4.66	4.66		
43	CBI28	U	Xylenes	0.40	0.40	0.40		
43	CBI29	U	Xylenes	28.7	30.4	30.4		
43	CBI3	U	Xylenes	12.0	12.0	12.0		
43	CBI30	U	Xylenes	70.9	71.5	71.5		
43	CBI31	U	Xylenes	12.0	12.0	12.0		
43	CBI32	U	Xylenes	1.55	1.56	1.56		
43	CBI33	U	Xylenes	5.57	5.58	5.58		
43	CBI5	U	Xylenes	24.0	24.2	24.2		
43	CBI6	U	Xylenes	0.75	0.76	0.76		
43	CBI7	U	Xylenes	67.5	69.2	69.2		
43	CBI8	U	Xylenes	22.8	23.0	23.0		
43	CBI9	U	Xylenes	12.0	12.1	12.12		
55	Chicopee	U	Xylenes	41.5	53.3	53.3		
56	Coyote Canyon	U	Xylenes	34.0	45.2	44.06		
56	Coyote Canyon	U	Xylenes	35.3	47.0			
56	Coyote Canyon	U	Xylenes	27.9	37.1			
56	Coyote Canyon	U	Xylenes	27.7	41.0			
56	Coyote Canyon	U	Xylenes	31.0	45.2			
56	Coyote Canyon	U	Xylenes	33.0	48.8			
41	Guadalupe	U	Xylenes	9.60	11.5	11.5		
51	Palos Verdes	Y	Xylenes	34.0	108	182		
51	Palos Verdes	Y	Xylenes	100	256			
50	Puente Hills	N	Xylenes	98.0	119	119		
59	Rockingham	U	Xylenes	24.1	32.0	32.0		
1	Scholl Canyon	N	Xylenes	3.10	7.09	7.09		
60	Sunshine Canyon	U	Xylenes	92.0	96.8	96.8		

* Y=Yes, N=No, U=Unknown** Values that are outlined indicate that data from only one landfill were available.

Appendix C

Background Data for Secondary Pollutant Emission Factors and Control Efficiencies

Appendix C information is contained in the files:

SECOND.XLS (Excel) or SECOND.WK3 (Lotus) - Secondary Pollutant emission factors for flares, boilers, engines and turbines.

LFGVOC~1.XLS (Excel) or LFGVOC~1.WK3 (Lotus) - Derivation of default VOC concentrations for landfill NMOC's.

CONTRO~2.XLS (Excel) or CONTRO~2.WK3 (Lotus) - Development of default control efficiencies for flares, boilers, engines and turbines.

CHLORI~2.XLS (Excel) or CHLORI~2.WK3 (Lotus) - Derivation of Chlorine defaults.

Appendix C-3: NOTES SHEET Background Data for Secondary Pollutant Emission Factors

Sheet B Flare Data
I5,I6,I8,I9   Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.
O11, O12 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
I14 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.
O16, O17 Outlet flow rate calculated based ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
O18, O19 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
I21 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.
O22, O23 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
O24 Outlet flow rate calculated based ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
I29, I30, I31, I36 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent sample
Sheet C Boiler Data
I5, I6, I25 I 46 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples
Sheet D Engines
H5, H6 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.
F7 Not specified as lean burn or rich burn, described as a low-NOx supercharged design.
O7 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
F8 Permit specifies that engine must operate under lean burn conditions
O9 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
H12 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.
F13 Not specified as lean burn or rich burn, described as a low-NOx supercharged design.
O13 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
F14 Permit specifies that engine must operate under lean burn conditions
O15 Outlet flow rate calculated based on ratio of total inlet carbon conc. and total outlet carbon conc., multiplied by the inlet flow rate (measured).
H16, H17 Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples
F20 Permit specifies that engine must operate under lean burn conditions
N20, N21 Values correspond to grains per dscf
Sheet E Turbine Data
I5   Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.
I6   Inlet flow readings for these sample dates were not measured (they were calculated based on outlet concs.). I used the flow rate measured at the same point the day before for the two subsequent samples.

AP-42 Ref.	BID Ref.	Date mo/yr	Landfill ID	Landfill Name	Device ID	Compound	Concentration (ppm or gr/dscf)	LFG Fuel Flow Rate (dscfm)	Methane Fraction	Methane Flow Rate (dscfm)	Methane Flow Rate (m^3/min)	Default Heat Content Btu/cf	Heat Input mmBtu/hr	Outlet Flow Rate (dscfm)	Emission Rate (lbs/hr)	Emission Rate (kg/hr)	Emission Factor (lbs/mmBtu)	Emission Factor (kg/hr/m^3/min)	EF Rating	Comments
	Carbon Monoxide																			
37	54	9/92	A	Arbor Hills	Flare	CO	394	4982	0.5693	2836.25	80.31	1,012	172.22	54,669	95.542	43.330	0.5548	0.540	B	EPA Method 10; Fuel flow estimated via carbon balance.
38	55	1990	B	BFI Facility, Chicopee	Flare	CO	236	1060	0.4780	506.68	14.35	1,012	30.77	11,400	11.925	5.408	0.3876	0.377	A	EPA Method 10; Fuel flow estimated via carbon balance.
17	12	1986	C	BKK Landfill	Flare	CO	172	1012	0.2400	242.88	6.88	1,012	14.75	7,728	5.892	2.672	0.3995	0.389	A	total combustion analysis used to determine CO
17	12	1986	C	BKK Landfill	Flare	CO	527	1012	0.2270	229.72	6.50	1,012	13.95	9,076	21.200	9.615	1.5199	1.478	A	Fuel flow estimated via carbon balance.
17	12	1986	C	BKK Landfill	Flare	CO	515	1012	0.2410	243.89	6.91	1,012	14.81	8,060	18.398	8.344	1.2424	1.208	A	Fuel flow estimated via carbon balance.
					Site C Average										15.16	6.88	1.05	1.02		
22	19	2/85	D	Bradley Pit	Flare	CO	259	1002	0.3650	365.73	10.36	1,012	22.21	36,275	41.643	18.886	1.8752	1.824	A	total combustion analysis used to determine CO; Exhaust flow estimated via carbon balance.
32	48	12/87	E	Calabasas	Flare	CO	453	667	0.3560	237.45	6.72	1,012	14.42	6,150	12.348	5.600	0.8565	0.833	A	Grab samples collected, CO analyzed by NDIR/GC using the TCA method; Exhaust flow estimated via carbon balance.
39	56	6/91	F	Coyote Canyon	Flare	CO	11.1	900	0.3400	306.00	8.66	1,012	18.58	17,158	0.844	0.383	0.0454	0.044	B	CARB Method 100
39	56	6/91	F	Coyote Canyon	Flare	CO	88.4	1835	0.3930	721.16	20.42	1,012	43.79	15,866	6.217	2.819	0.1420	0.138	B	CARB Method 100; Fuel flow estimated via carbon balance.
					Site F Average										3.530	1.601	0.094	0.091		
16	10	1/86	G	Mission Canyon	Flare	CO	87.0	291	0.1190	34.66	0.98	1,012	2.10	2,901	1.119	0.507	0.5315	0.517	A	CO analyzed using the TCA method; Exhaust flow estimated via carbon balance.
14	8	10/85	H	Operating Industries	Flare	CO	305	1600	0.2810	449.60	12.73	1,012	27.30	27,697	37.443	16.981	1.3716	1.334	A	CO analyzed using the TCA method; Exhaust flow estimated via carbon balance.
35	50	2/87	I	Palos Verdes	Flare	CO	190	1000	0.1100	110.00	3.11	1,012	6.68	14,976	12.612	5.720	1.8883	1.836	A	CO analyzed using the TCA method; Exhaust flow estimated via carbon balance.
35	50	2/87	I	Palos Verdes	Flare	CO	468	2200	0.1270	279.40	7.91	1,012	16.97	13,486	27.975	12.687	1.6490	1.604	A	
					Site I Average										20.29	9.20	1.77	1.72		
44	61	2-3/92	J	Pinelands	Flare	CO	4.30	1182	0.5224	617.48	17.48	1,012	37.49	8,213	0.157	0.071	0.0042	0.004	A	EPA Method 10; Fuel flow rate estimated via carbon balance.
34	50	2/88	K	Puente Hills	Flare	CO	721	1330	0.4740	630.42	17.85	1,012	38.28	13,090	41.833	18.972	1.0928	1.063	A	CO analyzed using the TCA method; Exhaust flow estimated via carbon balance.
33	49	12/87	L	Scholl Canyon	Flare	CO	63.0	850	0.2330	198.05	5.61	1,012	12.03	8,009	2.236	1.014	0.1860	0.181	A	CO analyzed using the TCA method; Exhaust flow estimated via carbon balance.
15	9	12/85	M	Sheldon Street	Flare	CO	310	160	0.1810	28.96	0.82	1,012	1.76	1,605	2.205	1.000	1.2541	1.220	A	CO analyzed using the TCA method; Exhaust flow estimated via carbon balance.
43	60	1991	N	Sunshine Canyon	Flare	CO	7.20	1467	0.5200	762.84	21.60	1,012	46.32	18,473	0.590	0.267	0.0127	0.012	B	SCAQMD Method 100.1
75	109	3/94	O	Contra Costa	Flare	CO	9.20	1033	0.3200	330.56	9.36	1,012	20.07	7,108	0.290	0.131	0.0144	0.014	A	BAAQMD Method ST-6
			Nitrogen Oxides																	
37	54	9/92	A	Arbor Hills	Flare	NOx	11.69	4982	0.5693	2836.25	80.31	1,012	172.22	54,669	4.654	2.111	0.0270	0.026	B	Only test #6 were data used; EPA Method 7E; Fuel flow estimated via carbon balance.
52	69	1992	P	Arizona St.	Flare	NOx	29.49	242	0.6000	145.20	4.11	1,012	8.82	3,246	0.697	0.316	0.0791	0.077	B	SDAPCD Method 20; Fuel flow estimated via carbon balance.
38	55	1990	B	BFI Facility, Chicopee	Flare	NOx	14.60	1060	0.4780	506.68	14.35	1,012	30.77	11,400	1.212	0.550	0.0394	0.038	A	EPA Method 7A; Fuel flow estimated via carbon balance.
17	12	1986	C	BKK Landfill	Flare	NOx	6.00	1012	0.2400	242.88	6.88	1,012	14.75	7,728	0.338	0.153	0.0229	0.022	A	NOx samples collected using Tedlar bag/integrated bag sample method, analysis not specified.
39	56	6/91	F	Coyote Canyon	Flare	NOx	11.65	900	0.3400	306.00	8.66	1,012	18.58	17,158	1.456	0.660	0.0783	0.076	B	Low fuel flow rate
39	56	6/91	F	Coyote Canyon	Flare	NOx	17.10	1835	0.3930	721.16	20.42	1,012	43.79	15,866	1.976	0.896	0.0451	0.044	B	High fuel flow rate
					Site F Average										1.716	0.778	0.062	0.060		
45	62	4/92	Q	Greentree	Flare	NOx	54.0	352	0.3100	109.12	3.09	1,012	6.63	6,921	2.721	1.234	0.4107	0.399	B	EPA M. 7D; Methane content estimated; excluded from EF derivation.
43	60	1991	N	Sunshine Canyon	Flare	NOx	16.50	1467	0.5200	762.84	21.60	1,012	46.32	18,473	2.220	1.007	0.0479	0.047	B	SCAQMD Method 100.1
70	104	12/94	R	Scottdale, PA	Flare	NOx	16.72	1420	0.1730	245.66	6.96	1,012	14.92	1,700	0.207	0.094	0.0139	0.013	A	EPA Method 7D
71	105	9/93	S	Seneca	Flare	NOx	13.50	596	0.2270	135.29	3.83	1,012	8.21	3,440	0.338	0.153	0.0412	0.040	A	EPA Method 7D
72	106	4/96	T	Wayne Township	Flare	NOx	85.0	248	0.3900	96.72	2.74	1,012	5.87	2,481	1.536	0.696	0.2615	0.254	C	EPA Method 7D; Emission rates between test runs varied by about 40%; high detection limits (about 70 ppmv); data excluded from EF derivation.
73	107	10/96	U	Bethlehem	Flare	NOx	7.90	1113	0.2440	271.57	7.69	1,012	16.49	7,233	0.416	0.189	0.0252	0.025	A	EPA Method 7E
74	108	11/93	V	Hartford	Flare	NOx	12.40	696	0.4680	325.73	9.22	1,012	19.78	10,227	0.923	0.419	0.0467	0.045	A	EPA Method 7E
75	109	3/94	O	Contra Costa	Flare	NOx	14.20	1033	0.3200	330.56	9.36	1,012	20.07	7,108	0.735	0.333	0.0366	0.036	A	BAAQMD ST-13A
	Particulate Matter																			
68	102	9/90	I	Palos Verdes	Flare (#5)	PM (TSP)	0.0060	1099	0.1710	187.93	5.32	1,012	11.41	7,219	0.371	0.168	0.0325	0.032	D	all measured PM was inorganic
68	102	12/94	I	Palos Verdes	Flare (#5)	PM (TSP)	0.0097	1662	0.1935	321.60	9.11	1,012	19.53	6,480	0.539	0.244	0.0276	0.027	D	all measured PM was inorganic
					Flare Average										0.455	0.206	0.030	0.029		
68	102	2/91	I	Palos Verdes	Flare (#3)	PM (TSP)	0.0084	1376	0.1940	266.94	7.56	1,012	16.21	6,701	0.482	0.219	0.0298	0.029	D	all but 0.0004 gr/dscf of the measured PM was inorganic
68	102	10/91	I	Palos Verdes	Flare (#2)	PM (TSP)	0.0096	1154	0.2105	242.92	6.88	1,012	14.75	6,178	0.508	0.231	0.0345	0.034	D	all measured PM was inorganic
68	102	3/92	I	Palos Verdes	Flare (#1)	PM (TSP)	0.0148	1288	0.2170	279.50	7.91	1,012	16.97	6,142	0.779	0.353	0.0459	0.045	D	all measured PM was inorganic
68	102	11/93	I	Palos Verdes	Flare (#6)	PM (TSP)	0.0068	1275	0.2190	279.23	7.91	1,012	16.95	7,569	0.441	0.200	0.0260	0.025	D	all measured PM was inorganic
68	102	5/96	I	Palos Verdes	Flare (#4)	PM (TSP)	0.0058	1434	0.2040	292.54	8.28	1,012	17.76	7,157	0.356	0.161	0.0200	0.019	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Site I Average										0.504	0.228	0.031	0.030		
68	102	8/92	L	Scholl Canyon	Flare (#1)	PM (TSP)	0.0050	806	0.3870	311.92	8.83	1,012	18.94	6,558	0.281	0.127	0.0148	0.014	D	all of the measured PM was inorganic
68	102	9/94	L	Scholl Canyon	Flare (#1)	PM (TSP)	0.0035	666	0.3170	211.12	5.98	1,012	12.82	6,375	0.191	0.087	0.0149	0.015	D	all of the measured PM was inorganic
68	102	5/96	L	Scholl Canyon	Flare (#1)	PM (TSP)	0.0046	639	0.3295	210.55	5.96	1,012	12.78	5,460	0.215	0.098	0.0168	0.016	D	all but 0.0001 gr/dscf of the measured PM was inorganic
					Flare Average										0.229	0.104	0.016	0.015		
68	102	7/90	L	Scholl Canyon	Flare (#2)	PM (TSP)	0.0013	1038	0.3090	320.74	9.08	1,012	19.48	6,623	0.074	0.033	0.0038	0.004	D	all of the measured PM was inorganic
68	102	7/93	L	Scholl Canyon	Flare (#2)	PM (TSP)	0.0038	682	0.3870	263.93	7.47	1,012	16.03	6,500	0.212	0.096	0.0132	0.013	D	all of the measured PM was inorganic
68	102	5/96	L	Scholl Canyon	Flare (#2)	PM (TSP)	0.0032	587	0.3015	176.98	5.01	1,012	10.75	5,025	0.138	0.063	0.0128	0.012	D	all of the measured PM was inorganic
					Flare Average										0.141	0.064	0.010	0.010		
68	102	8/92	L	Scholl Canyon	Flare (#3)	PM (TSP)	0.0013	643	0.3885	249.81	7.07	1,012	15.17	7,098	0.079	0.036	0.0052	0.005	D	all of the measured PM was inorganic
68	102	6/95	L	Scholl Canyon	Flare (#3)	PM (TSP)	0.0014	725	0.3080	223.30	6.32	1,012	13.56	6,974	0.084	0.038	0.0062	0.006	D	all of the measured PM was inorganic
					Flare Average										0.081	0.037	0.006	0.006		
68	102	8/92	L	Scholl Canyon	Flare (#4)	PM (TSP)	0.0010	686	0.3570	244.90	6.93	1,012	14.87	6,517	0.056	0.025	0.0038	0.004	D	all of the measured PM was inorganic
68	102	6/95	L	Scholl Canyon	Flare (#4)	PM (TSP)	0.0049	766	0.3075	235.55	6.67	1,012	14.30	5,907	0.248	0.113	0.0173	0.017	D	all of the measured PM was inorganic
					Flare Average										0.152	0.069	0.011	0.010		
68	102	7/90	L	Scholl Canyon	Flare (#5)	PM (TSP)	0.0031	875	0.2925	255.94	7.25	1,012	15.54	6,084	0.162	0.073	0.0104	0.010	D	all of the measured PM was inorganic
68	102	7/93	L	Scholl Canyon	Flare (#5)	PM (TSP)	0.0041	754	0.3425	258.25	7.31	1,012	15.68	7,074	0.249	0.113	0.0159	0.015	D	all of the measured PM was inorganic
68	102	6/95	L	Scholl Canyon	Flare (#5)	PM (TSP)	0.0015	751	0.3275	245.95	6.96	1,012	14.93	6,690	0.086	0.039	0.0058	0.006	D	all of the measured PM was inorganic
					Flare Average										0.165	0.075	0.011	0.010		
68	102	8/92	L	Scholl Canyon	Flare (#6)	PM (TSP)	0.0032	722	0.3410	246.20	6.97	1,012	14.95	7,259	0.199	0.090	0.0133	0.013	D	all of the measured PM was inorganic
68	102	6/95	L	Scholl Canyon	Flare (#6)	PM (TSP)	0.0017	772	0.3350	258.62	7.32	1,012	15.70	6,199	0.090	0.041	0.0058	0.006	D	all of the measured PM was inorganic
					Flare Average										0.145	0.066	0.010	0.009		
68	102	7/93	L	Scholl Canyon	Flare (#7)	PM (TSP)	0.0034	763	0.3640	277.73	7.86	1,012	16.86	7,240	0.211	0.096	0.0125	0.012	D	all of the measured PM was inorganic
68	102	5/96	L	Scholl Canyon	Flare (#7)	PM (TSP)	0.0018	565	0.3095	174.87	4.95	1,012	10.62	5,150	0.079	0.036	0.0075	0.007	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.145	0.066	0.010	0.010		
68	102	11/91	L	Scholl Canyon	Flare (#9)	PM (TSP)	0.0043	658	0.3155	207.60	5.88	1,012	12.61	5,594	0.206	0.094	0.0164	0.016	D	all but 0.0005 gr/dscf of the measured PM was inorganic
68	102	9/94	L	Scholl Canyon	Flare (#9)	PM (TSP)	0.0031	714	0.3135	223.84	6.34	1,012	13.59	6,586	0.175	0.079	0.0129	0.013	D	all of the measured PM was inorganic
					Flare Average										0.191	0.086	0.015	0.014		
68	102	11/91	L	Scholl Canyon	Flare (#10)	PM (TSP)	0.0064	681	0.3165	215.54	6.10	1,012	13.09	7,819	0.429	0.195	0.0328	0.032	D	all but 0.0021 gr/dscf of the measured PM was inorganic
68	102	9/94	L	Scholl Canyon	Flare (#10)	PM (TSP)	0.0026	732	0.3105	227.29	6.44	1,012	13.80	7,900	0.176	0.080	0.0128	0.012	D	all of the measured PM was inorganic
					Flare Average										0.302	0.137	0.023	0.022		
68	102	11/91	L	Scholl Canyon	Flare (#11)	PM (TSP)	0.0051	751	0.3225	242.20	6.86	1,012	14.71	7,062	0.309	0.140	0.0210	0.020	D	all of the measured PM was inorganic
68	102	9/94	L	Scholl Canyon	Flare (#11)	PM (TSP)	0.0031	766	0.3160	242.06	6.85	1,012	14.70	7,108	0.189	0.086	0.0129	0.012	D	all of the measured PM was inorganic
					Flare Average										0.249	0.113	0.017	0.016		
68	102	11/91	L	Scholl Canyon	Flare (#12)	PM (TSP)	0.0033	825	0.3255	268.54	7.60	1,012	16.31	8,617	0.244	0.111	0.0149	0.015	D	all of the measured PM was inorganic
68	102	7/93	L	Scholl Canyon	Flare (#12)	PM (TSP)	0.0042	690	0.3780	260.82	7.39	1,012	15.84	6,599	0.238	0.108	0.0150	0.015	D	all of the measured PM was inorganic
68	102	5/96	L	Scholl Canyon	Flare (#12)	PM (TSP)	0.0057	479	0.3280	157.11	4.45	1,012	9.54	5,365	0.262	0.119	0.0275	0.027	D	all of the measured PM was inorganic
					Flare Average										0.248	0.112	0.019	0.019		
					Site L Average										0.186	0.084	0.013	0.013		
68	102	1/94	W	Spadra	Flare (#1)	PM (TSP)	0.0079	662	0.3830	253.55	7.18	1,012	15.40	7,025	0.476	0.216	0.0309	0.030	D	all of the measured PM was inorganic
68	102	10/91	W	Spadra	Flare (#2)	PM (TSP)	0.0006	1000	0.3755	375.50	10.63	1,012	22.80	8,898	0.046	0.021	0.0020	0.002	D	all of the measured PM was inorganic
68	102	2/92	W	Spadra	Flare (#2)	PM (TSP)	0.0034	1000	0.3815	381.50	10.80	1,012	23.16	5,822	0.170	0.077	0.0073	0.007	D	all but 0.0004 gr/dscf of the measured PM was inorganic
68	102	5/95	W	Spadra	Flare (#2)	PM (TSP)	0.0012	994	0.3620	359.83	10.19	1,012	21.85	6,140	0.063	0.029	0.0029	0.003	D	all but 0.0001 gr/dscf of the measured PM was inorganic
					Flare Average										0.093	0.042	0.004	0.004		
68	102	2/92	W	Spadra	Flare (#3)	PM (TSP)	0.0037	988	0.3815	376.92	10.67	1,012	22.89	6,209	0.197	0.089	0.0086	0.008	D	all but 0.0002 gr/dscf of the measured PM was inorganic
68	102	5/95	W	Spadra	Flare (#3)	PM (TSP)	0.0013	987	0.3490	344.46	9.75	1,012	20.92	6,590	0.073	0.033	0.0035	0.003	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.135	0.061	0.006	0.006		
68	102	6/90	W	Spadra	Flare (#5)	PM (TSP)	0.0028	1026	0.3085	316.52	8.96	1,012	19.22	6,968	0.167	0.076	0.0087	0.008	D	all of the measured PM was inorganic
68	102	1/94	W	Spadra	Flare (#5)	PM (TSP)	0.0028	768	0.3085	236.93	6.71	1,012	14.39	8,717	0.209	0.095	0.0145	0.014	D	all of the measured PM was inorganic
					Flare Average										0.188	0.085	0.012	0.011		
68	102	10/91	W	Spadra	Flare (#6)	PM (TSP)	0.0007	1000	0.3340	334.00	9.46	1,012	20.28	10,612	0.064	0.029	0.0031	0.003	D	all of the measured PM was inorganic
68	102	3/93	W	Spadra	Flare (#6)	PM (TSP)	0.0076	754	0.3870	291.80	8.26	1,012	17.72	11,102	0.723	0.328	0.0408	0.040	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	4/96	W	Spadra	Flare (#6)	PM (TSP)	0.0051	890	0.3410	303.49	8.59	1,012	18.43	8,654	0.378	0.172	0.0205	0.020	D	all of the measured PM was inorganic
					Flare Average										0.388	0.176	0.021	0.021		
					Site W Average										0.256	0.116	0.015	0.014		
68	102	3/93	E	Calabasas	Flare (#1)	PM (TSP)	0.0026	1132	0.3820	432.42	12.24	1,012	26.26	9,753	0.217	0.099	0.0083	0.008	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	3/95	E	Calabasas	Flare (#1)	PM (TSP)	0.0086	740	0.3800	281.20	7.96	1,012	17.07	8,628	0.636	0.288	0.0372	0.036	D	all of the measured PM was inorganic
					Flare Average										0.427	0.194	0.023	0.020		
68	102	3/93	E	Calabasas	Flare (#2)	PM (TSP)	0.0031	930	0.3980	370.14	10.48	1,012	22.47	8,701	0.231	0.105	0.0103	0.010	D	all but 0.0003 gr/dscf of the measured PM was inorganic
68	102	2/91	E	Calabasas	Flare (#3)	PM (TSP)	0.0058	875	0.3240	283.50	8.03	1,012	17.21	6,191	0.308	0.140	0.0179	0.017	D	all but 0.0005 gr/dscf of the measured PM was inorganic
68	102	2/92	E	Calabasas	Flare (#3)	PM (TSP)	0.0029	1078	0.3325	358.44	10.15	1,012	21.76	10,940	0.272	0.123	0.0125	0.012	D	all but 0.0004 gr/dscf of the measured PM was inorganic
68	102	3/95	E	Calabasas	Flare (#3)	PM (TSP)	0.0054	719	0.3820	274.66	7.78	1,012	16.68	8,414	0.389	0.177	0.0234	0.023	D	all but 0.0002 gr/dscf of the measured PM was inorganic

Secondary Pollutant Emission Factor
Summary Statistics (kg/hr/m^3/min)
Flares

Carbon Monoxide		Oxides of Nitrogen		Particulate Matter	
Mean	0.7169	Mean	0.0390	Mean	0.0179
Standard Error	0.1612	Standard Error	0.0055	Standard Error	0.0031
Median	0.5395	Median	0.0383	Median	0.0158
Standard Deviation	0.6243	Standard Deviation	0.0181	Standard Deviation	0.0070
Sample Variance	0.3898	Sample Variance	0.0003	Sample Variance	4.8984E-005
Kurtosis	-1.0601	Kurtosis	0.6177	Kurtosis	4.3412
Skewness	0.4362	Skewness	0.7693	Skewness	2.0370
Range	1.8196	Range	0.0634	Range	0.0173
Minimum	0.0041	Minimum	0.0135	Minimum	0.0129
Maximum	1.8236	Maximum	0.0769	Maximum	0.0302
Sum	10.7533	Sum	0.4294	Sum	0.0895
Count	15.0000	Count	11.0000	Count	5.0000
Confidence Level(95.0%	0.3457	Confidence Level(95.0%	0.0122	Confidence Level(95.0%	0.0087
Normality test	p>0.2	Normality test	p>0.2	Normality test	p<0.05
				Normality test (lognorm	p<0.05

Carbon Monoxide Data Points	Oxides of Nitrogen Data Points	Particulate Matter Data Points
0.5395	0.0263	0.0302
0.3769	0.0769	0.0129
1.0249	0.0383	0.0144
1.8236	0.0223	0.0162
0.8329	0.0600	0.0158
0.0911	0.0466	
0.5169	0.0135	
1.3338	0.0400	
1.7199	0.0245	
0.0041	0.0454	
1.0628	0.0356	
0.1809		
1.2196		
0.0124		
0.0140		

Appendix C-3: FLARES SHEET Background Data for Secondary Pollutant Emission Factors

AP-42 Ref.	BID Ref.	Date mo/yr	Landfill ID	Landfill Name	Device ID	Compound	Concentration (ppm or gr/dscf)	LFG Fuel Flow Rate (dscfm)	Methane Fraction	Methane Flow Rate (dscfm)	Methane Flow Rate (m^3/min)	Default Heat Content Btu/cf	Heat Input mmBtu/hr	Outlet Flow Rate (dscfm)	Emission Rate (lbs/hr)	Emission Rate (kg/hr)	Emission Factor (lbs/mmBtu)	Emission Factor (kg/hr/m^3/min)	EF Rating	Comments
					Flare Average										0.323	0.147	0.018	0.017		
68	102	3/90	E	Calabasas	Flare (#4)	PM (TSP)	0.0100	711	0.2495	177.39	5.02	1,012	10.77	4,621	0.396	0.180	0.0368	0.036	D	no data on organic/inorganic fractions
68	102	2/92	E	Calabasas	Flare (#4)	PM (TSP)	0.0042	1110	0.3230	358.53	10.15	1,012	21.77	8,656	0.312	0.141	0.0143	0.014	D	all but 0.0007 gr/dscf of the measured PM was inorganic
68	102	3/95	E	Calabasas	Flare (#4)	PM (TSP)	0.0020	736	0.3640	267.90	7.59	1,012	16.27	8,423	0.144	0.065	0.0089	0.009	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.284	0.129	0.020	0.019		
68	102	3/90	E	Calabasas	Flare (#5)	PM (TSP)	0.0089	909	0.2495	226.80	6.42	1,012	13.77	6,349	0.484	0.220	0.0352	0.034	D	no data on organic/inorganic fractions
68	102	3/93	E	Calabasas	Flare (#5)	PM (TSP)	0.0032	1046	0.3730	390.16	11.05	1,012	23.69	10,553	0.289	0.131	0.0122	0.012	D	all but 0.0003 gr/dscf of the measured PM was inorganic
					Flare Average										0.387	0.175	0.024	0.023		
68	102	3/90	E	Calabasas	Flare (#6)	PM (TSP)	0.0072	791	0.2540	200.91	5.69	1,012	12.20	5,394	0.333	0.151	0.0273	0.027	D	no data on organic/inorganic fractions
68	102	2/94	E	Calabasas	Flare (#6)	PM (TSP)	0.0078	849	0.3885	329.84	9.34	1,012	20.03	7,408	0.495	0.225	0.0247	0.024	D	all of the measured PM was inorganic
68	102	3/96	E	Calabasas	Flare (#6)	PM (TSP)	0.0049	887	0.3225	286.06	8.10	1,012	17.37	8,651	0.363	0.165	0.0209	0.020	D	all of the measured PM was inorganic
					Flare Average										0.397	0.180	0.024	0.024		
68	102	2/91	E	Calabasas	Flare (#7)	PM (TSP)	0.0050	886	0.3330	295.04	8.35	1,012	17.91	5,818	0.249	0.113	0.0139	0.014	D	all but 0.0005 gr/dscf of the measured PM was inorganic
68	102	7/95	E	Calabasas	Flare (#7)	PM (TSP)	0.0048	1311	0.3605	472.62	13.38	1,012	28.70	10,752	0.442	0.201	0.0154	0.015	D	all of the measured PM was inorganic
					Flare Average										0.346	0.157	0.015	0.014		
68	102	3/96	E	Calabasas	Flare (#8)	PM (TSP)	0.0029	1426	0.3130	446.34	12.64	1,012	27.10	8,907	0.221	0.100	0.0082	0.008	D	all of the measured PM was inorganic
68	102	3/96	E	Calabasas	Flare (#9)	PM (TSP)	0.0038	1159	0.3220	373.20	10.57	1,012	22.66	7,570	0.247	0.112	0.0109	0.011	D	all of the measured PM was inorganic
					Site E Average										0.318	0.144	0.017	0.016		
68	102	10/90	K	Puente Hills	Flare (#2)	PM (TSP)	0.0053	830	0.4170	346.11	9.80	1,012	21.02	10,249	0.466	0.211	0.0222	0.022	D	all but 0.0007 gr/dscf of the measured PM was inorganic
68	102	2/93	K	Puente Hills	Flare (#2)	PM (TSP)	0.0036	1071	0.4320	462.67	13.10	1,012	28.09	11,382	0.351	0.159	0.0125	0.012	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	8/95	K	Puente Hills	Flare (#2)	PM (TSP)	0.0005	713	0.3750	267.38	7.57	1,012	16.24	9,770	0.042	0.019	0.0026	0.003	D	no data on organic/inorganic fractions
					Flare Average										0.286	0.130	0.012	0.012		
68	102	10/90	K	Puente Hills	Flare (#3)	PM (TSP)	0.0039	776	0.3690	286.34	8.11	1,012	17.39	10,084	0.337	0.153	0.0194	0.019	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	5/94	K	Puente Hills	Flare (#3)	PM (TSP)	0.0023	964	0.4420	426.09	12.07	1,012	25.87	9,138	0.180	0.082	0.0070	0.007	D	all of the measured PM was inorganic
					Flare Average										0.259	0.117	0.013	0.013		
68	102	10/90	K	Puente Hills	Flare (#4)	PM (TSP)	0.0035	840	0.3320	278.88	7.90	1,012	16.93	11,917	0.358	0.162	0.0211	0.021	D	all but 0.0006 gr/dscf of the measured PM was inorganic
68	102	2/93	K	Puente Hills	Flare (#4)	PM (TSP)	0.0049	1044	0.4325	451.53	12.79	1,012	27.42	10,961	0.460	0.209	0.0168	0.016	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	8/95	K	Puente Hills	Flare (#4)	PM (TSP)	0.0008	641	0.3850	246.79	6.99	1,012	14.98	8,925	0.061	0.028	0.0041	0.004	D	no data on organic/inorganic fractions
					Flare Average										0.293	0.133	0.014	0.014		
68	102	5/91	K	Puente Hills	Flare (#5)	PM (TSP)	0.0041	701	0.4320	302.83	8.58	1,012	18.39	11,455	0.403	0.183	0.0219	0.021	D	all of the measured PM was inorganic
68	102	5/94	K	Puente Hills	Flare (#5)	PM (TSP)	0.0107	926	0.4305	398.64	11.29	1,012	24.21	8,435	0.774	0.351	0.0320	0.031	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.588	0.267	0.027	0.026		
68	102	12/91	K	Puente Hills	Flare (#6)	PM (TSP)	0.0034	836	0.3975	332.31	9.41	1,012	20.18	9,874	0.288	0.131	0.0143	0.014	D	all but 0.0003 gr/dscf of the measured PM was inorganic
68	102	2/93	K	Puente Hills	Flare (#6)	PM (TSP)	0.0032	1123	0.4240	476.15	13.48	1,012	28.91	11,061	0.303	0.138	0.0105	0.010	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	3/95	K	Puente Hills	Flare (#6)	PM (TSP)	0.0080	785	0.4585	359.92	10.19	1,012	21.85	8,994	0.617	0.280	0.0282	0.027	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.403	0.183	0.018	0.017		
68	102	5/91	K	Puente Hills	Flare (#7)	PM (TSP)	0.0058	936	0.4220	394.99	11.18	1,012	23.98	9,902	0.492	0.223	0.0205	0.020	D	all of the measured PM was inorganic
68	102	5/94	K	Puente Hills	Flare (#7)	PM (TSP)	0.0007	700	0.4220	295.40	8.36	1,012	17.94	7,725	0.046	0.021	0.0026	0.003	D	all of the measured PM was inorganic
					Flare Average										0.269	0.122	0.012	0.011		
68	102	2/93	K	Puente Hills	Flare (#8)	PM (TSP)	0.0046	1084	0.4430	480.21	13.60	1,012	29.16	11,581	0.457	0.207	0.0157	0.015	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	3/95	K	Puente Hills	Flare (#8)	PM (TSP)	0.0050	842	0.3380	284.60	8.06	1,012	17.28	9,974	0.427	0.194	0.0247	0.024	D	all of the measured PM was inorganic
					Flare Average										0.442	0.200	0.020	0.020		
68	102	6/90	K	Puente Hills	Flare (#9)	PM (TSP)	0.0041	684	0.3560	243.50	6.90	1,012	14.79	9,197	0.323	0.147	0.0219	0.021	D	all but 0.0004 gr/dscf of the measured PM was inorganic
68	102	5/94	K	Puente Hills	Flare (#9)	PM (TSP)	0.0012	880	0.4175	367.40	10.40	1,012	22.31	9,085	0.093	0.042	0.0042	0.004	D	all of the measured PM was inorganic
					Flare Average										0.208	0.094	0.013	0.013		
68	102	6/90	K	Puente Hills	Flare (#10)	PM (TSP)	0.0040	739	0.3625	267.89	7.59	1,012	16.27	11,641	0.399	0.181	0.0245	0.024	D	all but 0.0006 gr/dscf of the measured PM was inorganic
68	102	12/93	K	Puente Hills	Flare (#10)	PM (TSP)	0.0031	942	0.4135	389.52	11.03	1,012	23.65	9,884	0.263	0.119	0.0111	0.011	D	all of the measured PM was inorganic
68	102	3/95	K	Puente Hills	Flare (#10)	PM (TSP)	0.0031	935	0.4460	417.01	11.81	1,012	25.32	9,455	0.251	0.114	0.0099	0.010	D	all of the measured PM was inorganic
					Flare Average										0.304	0.138	0.015	0.015		
68	102	6/90	K	Puente Hills	Flare (#11)	PM (TSP)	0.0036	915	0.3845	351.82	9.96	1,012	21.36	13,503	0.417	0.189	0.0195	0.019	D	all but 0.0005 gr/dscf of the measured PM was inorganic
68	102	5/92	K	Puente Hills	Flare (#11)	PM (TSP)	0.0018	954	0.4040	385.42	10.91	1,012	23.40	9,568	0.148	0.067	0.0063	0.006	D	all of the measured PM was inorganic
68	102	2/96	K	Puente Hills	Flare (#11)	PM (TSP)	0.0020	1066	0.3995	425.87	12.06	1,012	25.86	8,233	0.141	0.064	0.0055	0.005	D	all but 0.0001 gr/dscf of the measured PM was inorganic
					Flare Average										0.235	0.107	0.010	0.010		
68	102	6/90	K	Puente Hills	Flare (#12)	PM (TSP)	0.0036	840	0.3855	323.82	9.17	1,012	19.66	11,571	0.357	0.162	0.0182	0.018	D	all but 0.0006 gr/dscf of the measured PM was inorganic
68	102	12/93	K	Puente Hills	Flare (#12)	PM (TSP)	0.0051	961	0.3985	382.96	10.84	1,012	23.25	10,399	0.455	0.206	0.0195	0.019	D	all of the measured PM was inorganic
68	102	3/95	K	Puente Hills	Flare (#12)	PM (TSP)	0.0052	880	0.3260	286.88	8.12	1,012	17.42	9,902	0.441	0.200	0.0253	0.025	D	all of the measured PM was inorganic
					Flare Average										0.418	0.189	0.021	0.020		
68	102	7/90	K	Puente Hills	Flare (#13)	PM (TSP)	0.0046	749	0.4210	315.33	8.93	1,012	19.15	8,814	0.348	0.158	0.0182	0.018	D	all but 0.0002 gr/dscf of the measured PM was inorganic
68	102	5/92	K	Puente Hills	Flare (#13)	PM (TSP)	0.0026	816	0.4125	336.60	9.53	1,012	20.44	10,220	0.228	0.103	0.0111	0.011	D	all of the measured PM was inorganic
68	102	2/96	K	Puente Hills	Flare (#13)	PM (TSP)	0.0016	901	0.4020	362.20	10.26	1,012	21.99	9,250	0.127	0.058	0.0058	0.006	D	all of the measured PM was inorganic
					Flare Average										0.234	0.106	0.012	0.011		
68	102	7/90	K	Puente Hills	Flare (#14)	PM (TSP)	0.0063	774	0.4300	332.82	9.42	1,012	20.21	9,598	0.518	0.235	0.0256	0.025	D	all but 0.0004 gr/dscf of the measured PM was inorganic
68	102	12/93	K	Puente Hills	Flare (#14)	PM (TSP)	0.0048	979	0.4060	397.47	11.26	1,012	24.13	9,817	0.404	0.183	0.0167	0.016	D	all of the measured PM was inorganic
					Flare Average										0.461	0.209	0.021	0.021		
68	102	7/90	K	Puente Hills	Flare (#15)	PM (TSP)	0.0047	754	0.3890	293.31	8.31	1,012	17.81	10,782	0.434	0.197	0.0244	0.024	D	all of the measured PM was inorganic
68	102	2/96	K	Puente Hills	Flare (#15)	PM (TSP)	0.0015	822	0.3710	304.96	8.64	1,012	18.52	10,089	0.130	0.059	0.0070	0.007	D	all of the measured PM was inorganic
					Flare Average										0.282	0.128	0.016	0.015		
68	102	7/90	K	Puente Hills	Flare (#16)	PM (TSP)	0.0065	715	0.3835	274.20	7.76	1,012	16.65	8,978	0.500	0.227	0.0300	0.029	D	all but 0.0009 gr/dscf of the measured PM was inorganic
68	102	12/93	K	Puente Hills	Flare (#16)	PM (TSP)	0.0078	896	0.4205	376.77	10.67	1,012	22.88	11,006	0.736	0.334	0.0322	0.031	D	all but 0.0015 gr/dscf of the measured PM was inorganic
					Flare Average										0.618	0.280	0.031	0.030		
68	102	5/91	K	Puente Hills	Flare (#17)	PM (TSP)	0.0052	1025	0.4160	426.40	12.07	1,012	25.89	10,946	0.488	0.221	0.0188	0.018	D	all of the measured PM was inorganic
68	102	5/92	K	Puente Hills	Flare (#17)	PM (TSP)	0.0024	968	0.3860	373.65	10.58	1,012	22.69	10,181	0.209	0.095	0.0092	0.009	D	all of the measured PM was inorganic
					Flare Average										0.349	0.158	0.014	0.014		
68	102	12/91	K	Puente Hills	Flare (#18)	PM (TSP)	0.0021	817	0.3995	326.39	9.24	1,012	19.82	9,899	0.178	0.081	0.0090	0.009	D	all of the measured PM was inorganic
68	102	11/92	K	Puente Hills	Flare (#18)	PM (TSP)	0.0035	969	0.4250	411.83	11.66	1,012	25.01	10,135	0.304	0.138	0.0122	0.012	D	all but 0.0001 gr/dscf of the measured PM was inorganic
68	102	8/95	K	Puente Hills	Flare (#18)	PM (TSP)	0.0049	702	0.4150	291.33	8.25	1,012	17.69	6,613	0.278	0.126	0.0157	0.015	D	no data on organic/inorganic fractions
					Flare Average										0.253	0.115	0.012	0.012		
68	102	5/91	K	Puente Hills	Flare (#19)	PM (TSP)	0.0060	1096	0.3820	418.67	11.86	1,012	25.42	7,854	0.404	0.183	0.0159	0.015	D	all of the measured PM was inorganic
68	102	5/92	K	Puente Hills	Flare (#19)	PM (TSP)	0.0024	946	0.3780	357.59	10.13	1,012	21.71	9,980	0.205	0.093	0.0095	0.009	D	all of the measured PM was inorganic
					Flare Average										0.305	0.138	0.013	0.012		
68	102	12/91	K	Puente Hills	Flare (#20)	PM (TSP)	0.0061	1037	0.3900	404.43	11.45	1,012	24.56	9,560	0.500	0.227	0.0204	0.020	D	all of the measured PM was inorganic
68	102	11/92	K	Puente Hills	Flare (#20)	PM (TSP)	0.0033	813	0.4360	354.47	10.04	1,012	21.52	9,521	0.269	0.122	0.0125	0.012	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.385	0.174	0.016	0.016		
68	102	12/91	K	Puente Hills	Flare (#22)	PM (TSP)	0.0057	829	0.3890	322.48	9.13	1,012	19.58	9,615	0.470	0.213	0.0240	0.023	D	all but 0.0002 gr/dscf of the measured PM was inorganic
68	102	11/92	K	Puente Hills	Flare (#22)	PM (TSP)	0.0038	888	0.4310	382.73	10.84	1,012	23.24	10,097	0.329	0.149	0.0142	0.014	D	all but 0.0002 gr/dscf of the measured PM was inorganic
					Flare Average										0.399	0.181	0.019	0.019		
68	102	10/90	K	Puente Hills	Flare (#24)	PM (TSP)	0.0030	592	0.4030	238.58	6.76	1,012	14.49	10,300	0.265	0.120	0.0183	0.018	D	all but 0.0002 gr/dscf of the measured PM was inorganic
68	102	10/92	K	Puente Hills	Flare (#24)	PM (TSP)	0.0031	838	0.4150	347.77	9.85	1,012	21.12	9,689	0.257	0.117	0.0122	0.012	D	all but 0.0003 gr/dscf of the measured PM was inorganic
68	102	8/95	K	Puente Hills	Flare (#24)	PM (TSP)	0.0006	630	0.4070	256.41	7.26	1,012	15.57	8,046	0.041	0.019	0.0027	0.003	D	no data on organic/inorganic fractions
					Flare Average										0.188	0.085	0.011	0.011		
					Site K Average										0.342	0.155	0.016	0.016		

Secondary Pollutant Emission Factor Summary Statistics (kg/hr/m^3/min)

Flares

BID Ref.	AP-42 Ref.	Date mo/yr	Landfill ID	Landfill Name	Device ID	Compound	Conc. (ppmv or gr/dscf)	LFG Fuel Flow Rate (scfm)	Methane Fraction	Methane Flow Rate (scfm)	Methane Flow Rate (m^3/min)	Default Heat Content Btu/cf	Heat Input mmBtu/hr	Outlet Flow Rate (dscfm)	Emission Rate (lbs/hr)	Emission Rate (kg/hr)	Emission Factor (lbs/mmBtu)	Emission Factor (kg/hr/m^3/min)	EF Rating	Comments
		Carbon Monoxide																		
102	68	8/91	A	Puente Hills	Boiler #400	CO	1.30	9740	0.4250	4140	117.22	1,012	251.35	65,722	0.379	0.172	0.0015	0.0015	D	Summary Data Only; Fuel flow estimated via carbon balance.
70	53	9/93	A	Puente Hills	Boiler #400	CO	9.60	10870	0.4305	4680	132.51	1,012	284.14	69,770	2.969	1.346	0.0104	0.0102	C	SCAQMD Method 100.1; Fuel flow estimated via carbon balance
					Boiler Average										1.674	0.759	0.006	0.006		
102	68	9/90	A	Puente Hills	Boiler #300	CO	2.60	10907	0.3895	4248	120.30	1,012	257.96	68,902	0.794	0.360	0.0031	0.0030	D	Summary Data Only
102	68	8/92	A	Puente Hills	Boiler #300	CO	0.03	9720	0.4305	4184	118.49	1,012	254.08	67,490	0.009	0.004	0.0000	0.0000	D	Summary Data Only
102	68	11/94	A	Puente Hills	Boiler #300	CO	0.10	11390	0.4230	4818	136.43	1,012	292.55	77,190	0.034	0.016	0.0001	0.0001	D	Summary Data Only
102	68	11/95	A	Puente Hills	Boiler #300	CO	7.00	10755	0.3730	4012	113.60	1,012	243.59	65,984	2.047	0.928	0.0084	0.0082	D	Summary Data Only
					Boiler Average										0.721	0.327	0.003	0.003		
					Site A Average											0.543	0.004	0.004		Used in EF derivation.
102	68	12/92	B	Palos Verdes	Boiler #1	CO	13.90	3573	0.1955	699	19.78	1,012	42.41	14,615	0.900	0.408	0.0212	0.0206	D	Summary Data Only; Includes CNG Fuel Supplement (~5% by vo
102	68	12/94	B	Palos Verdes	Boiler #1	CO	1.15	3296	0.1880	620	17.55	1,012	37.63	13,578	0.069	0.031	0.0018	0.0018	D	Summary Data Only; Includes CNG Fuel Supplement (~5% by vo
					Boiler Average										0.485	0.220	0.012	0.011		Used in EF derivation.
102	68	8/92	C	Spadra	Boiler	CO	1.60	3137	0.4255	1335	37.80	1,012	81.05	13,430	0.095	0.043	0.0012	0.0011	D	Summary Data Only
102	68	9/93	C	Spadra	Boiler	CO	0.80	3752	0.3800	1426	40.37	1,012	86.57	19,720	0.070	0.032	0.0008	0.0008	D	Summary Data Only
102	68	12/94	C	Spadra	Boiler	CO	0.30	3926	0.3385	1329	37.63	1,012	80.69	18,110	0.024	0.011	0.0003	0.0003	D	Summary Data Only
					Boiler Average										0.063	0.029	0.001	0.001		Used in EF derivation.
		Nitrogen Oxides																		
56	39	8/93	D	Coyote Canyon	Boiler	NOx	6.00	9950	0.3370	3353	94.95	1,012	203.60	122,657	5.359	2.430	0.0263	0.0256	C	CARB method 100; Used in EF derivation.
102	68	8/91	A	Puente Hills	Boiler #400	NOx	14.10	9740	0.4250	4140	117.22	1,012	251.35	65,722	6.748	3.060	0.0268	0.0261	D	Summary Data Only
70	53	9/93	A	Puente Hills	Boiler #400	NOx	17.30	10870	0.4305	4680	132.51	1,012	284.14	69,770	8.789	3.986	0.0309	0.0301	C	SCAQMD Method 100.1
					Boiler Average										7.769	3.523	0.029	0.028		
102	68	9/90	A	Puente Hills	Boiler #300	NOx	16.60	10907	0.3895	4248	120.30	1,012	257.96	68,902	8.329	3.777	0.0323	0.0314	D	Summary Data Only
102	68	8/92	A	Puente Hills	Boiler #300	NOx	10.70	9720	0.4305	4184	118.49	1,012	254.08	67,490	5.259	2.385	0.0207	0.0201	D	Summary Data Only
102	68	11/94	A	Puente Hills	Boiler #300	NOx	15.80	11390	0.4230	4818	136.43	1,012	292.55	77,190	8.881	4.028	0.0304	0.0295	D	Summary Data Only
102	68	11/95	A	Puente Hills	Boiler #300	NOx	16.70	10755	0.3730	4012	113.60	1,012	243.59	65,984	8.024	3.639	0.0329	0.0320	D	SCAQMD Method 100.1
					Boiler Average										7.623	3.457	0.029	0.028		
					Site A Average											3.490	0.029	0.028		Used in EF derivation.
102	68	12/92	B	Palos Verdes	Boiler #1	NOx	18.40	3573	0.1955	699	19.78	1,012	42.41	14,615	1.958	0.888	0.0462	0.0449	D	Summary Data Only
102	68	12/94	B	Palos Verdes	Boiler #1	NOx	17.70	3296	0.1880	620	17.55	1,012	37.63	13,578	1.750	0.794	0.0465	0.0452	D	Summary Data Only
					Boiler Average										1.854	0.841	0.046	0.045		
102	68	11/93	B	Palos Verdes	Boiler #2	NOx	23.00	3504	0.2205	773	21.88	1,012	46.91	12,847	2.152	0.976	0.0459	0.0446	D	Summary Data Only
					Site B Average											0.908	0.046	0.045		Used in EF derivation.
102	68	8/91	C	Spadra	Boiler	NOx	23.40	3240	0.3595	1165	32.98	1,012	70.73	16,410	2.796	1.268	0.0395	0.0384	D	Summary Data Only
102	68	8/92	C	Spadra	Boiler	NOx	17.70	3137	0.4255	1335	37.80	1,012	81.05	13,430	1.731	0.785	0.0214	0.0208	D	Summary Data Only
102	68	9/93	C	Spadra	Boiler	NOx	18.10	3752	0.3800	1426	40.37	1,012	86.57	19,720	2.599	1.179	0.0300	0.0292	D	Summary Data Only
102	68	12/94	C	Spadra	Boiler	NOx	21.00	3926	0.3385	1329	37.63	1,012	80.69	18,110	2.769	1.256	0.0343	0.0334	D	Summary Data Only
102	68	12/95	C	Spadra	Boiler	NOx	20.30	3953	0.3400	1344	38.06	1,012	81.61	17,357	2.566	1.164	0.0314	0.0306	D	Summary Data Only
					Site C Average										2.492	1.130	0.031	0.030		Used in EF derivation.
		Particulate Matter																		
70	53	9/93	A	Puente Hills	Boiler #400	PM (TSP)	0.0063	10870	0.4305	4680	132.51	1,012	284.14	69,770	3.768	1.709	0.0133	0.0129	C	all but 0.0002 gr/dscf was inorganic
102	68	8/91	A	Puente Hills	Boiler #400	PM (TSP)	0.0015	9740	0.4250	4140	117.22	1,012	251.35	65,722	0.845	0.383	0.0034	0.0033	D	0.0005 gr/dscf of the measured PM was inorganic
					Boiler Average										2.306	1.046	0.008	0.008		
102	68	11/95	A	Puente Hills	Boiler #300	PM (TSP)	0.0044	10755	0.3730	4012	113.60	1,012	243.59	65,984	2.489	1.129	0.0102	0.0099	D	all measured PM was inorganic
102	68	11/94	A	Puente Hills	Boiler #300	PM (TSP)	0.0032	11390	0.4230	4818	136.43	1,012	292.55	77,190	2.117	0.960	0.0072	0.0070	D	all measured PM was inorganic
102	68	8/92	A	Puente Hills	Boiler #300	PM (TSP)	0.0038	9720	0.4305	4184	118.49	1,012	254.08	67,490	2.198	0.997	0.0087	0.0084	D	all but 0.0001 gr/dscf was inorganic
102	68	9/90	A	Puente Hills	Boiler #300	PM (TSP)	0.0034	10907	0.3895	4248	120.30	1,012	257.96	68,902	2.008	0.911	0.0078	0.0076	D	all measured PM was inorganic
					Boiler Average										2.203	0.999	0.008	0.008		
					Site A Average											1.007	0.008	0.008		Used in EF derivation.
102	68	12/92	B	Palos Verdes	Boiler #1	PM (TSP)	0.0027	3573	0.1955	699	19.78	1,012	42.41	14,615	0.338	0.153	0.0080	0.0078	D	all measured PM was inorganic
102	68	12/94	B	Palos Verdes	Boiler #1	PM (TSP)	0.0041	3296	0.1880	620	17.55	1,012	37.63	13,578	0.477	0.216	0.0127	0.0123	D	all measured PM was inorganic
					Boiler Average										0.408	0.185	0.010	0.010		
102	68	11/93	B	Palos Verdes	Boiler #2	PM (TSP)	0.0060	3504	0.2205	773	21.88	1,012	46.91	12,847	0.661	0.300	0.0141	0.0137	D	all measured PM was inorganic
102	68	12/95	B	Palos Verdes	Boiler #2	PM (TSP)	0.0010	3404	0.2055	700	19.81	1,012	42.47	12,774	0.109	0.050	0.0026	0.0025	D	all measured PM was inorganic
					Boiler Average										0.385	0.175	0.008	0.008		
					Site B Average											0.177	0.009	0.009		Used in EF derivation.
102	68	8/91	C	Spadra	Boiler	PM (TSP)	0.0032	3240	0.3595	1165	32.98	1,012	70.73	16,410	0.450	0.204	0.0064	0.0062	D	all measured PM was inorganic
102	68	8/92	C	Spadra	Boiler	PM (TSP)	0.0059	3137	0.4255	1335	37.80	1,012	81.05	13,430	0.679	0.308	0.0084	0.0081	D	all but 0.0006 gr/dscf was inorganic
102	68	9/93	C	Spadra	Boiler	PM (TSP)	0.0032	3752	0.3800	1426	40.37	1,012	86.57	19,720	0.541	0.245	0.0062	0.0061	D	all but 0.0002 gr/dscf was inorganic
102	68	12/94	C	Spadra	Boiler	PM (TSP)	0.0049	3926	0.3385	1329	37.63	1,012	80.69	18,110	0.761	0.345	0.0094	0.0092	D	all measured PM was inorganic
102	68	12/95	C	Spadra	Boiler	PM (TSP)	0.0025	3953	0.3400	1344	38.06	1,012	81.61	17,357	0.372	0.169	0.0046	0.0044	D	all measured PM was inorganic
					Boiler Average										0.561	0.254	0.007	0.007		Used in EF derivation.

Summary Statistics (kg/hr/m^3/min)

Boilers

Carbon Monoxide		**Oxides of Nitrogen**		**Particulate Matter**	
Mean	0.0054	Mean	0.0323	Mean	0.0079
Standard Error	0.0031	Standard Error	0.0043	Standard Error	0.0005
Median	0.0043	Median	0.0293	Median	0.0082
Standard Deviation	0.0053	Standard Deviation	0.0086	Standard Deviation	0.0009
Sample Variance	0.00002836091	Sample Variance	0.0000741	Sample Variance	0.000000886
Kurtosis	ERR	Kurtosis	2.9973	Kurtosis	ERR
Skewness	0.8935	Skewness	1.6834	Skewness	-1.4295
Range	0.0105	Range	0.0192	Range	0.0018
Minimum	0.0007	Minimum	0.0256	Minimum	0.0068
Maximum	0.0112	Maximum	0.0448	Maximum	0.0086
Sum	0.0163	Sum	0.1291	Sum	0.0236
Count	3.0000	Count	4.0000	Count	3.0000
Confidence Level(95.0%)	0.0132	Confidence Level(95.0%)	0.0137	Confidence Level(95.0%)	0.0023
		Normality test	p<0.15		

Carbon Monoxide Data Points	Oxides of Nitrogen Data Points	Particulate Matter Data Points
0.0043	0.0256	0.0082
0.0112	0.0282	0.0086
0.0007	0.0448	0.0068
	0.0305	

NOTE: Boilers are equipped with LNB/FGR.

AP-42 Ref.	BID Ref.	Date mo/yr	Landfill ID	Landfill Name	Device ID	Compound	LFG Fuel Flow Rate (scfm)	Methane Fraction	Methane Flow Rate (scfm)	Methane Flow Rate (m^3/min)	Default Heat Content Btu/cf	Heat Input mmBtu/hr	Conc. (ppm or gr/dscf)	Outlet Flow Rate (dscfm)	Emission Rate (lbs/hr)	Emission Rate (kg/hr)	Emission Factor (lbs/mmBtu)	Emission Factor (kg/hr/m^3/min	EF Rating	Comments
	Carbon Monoxide																			
50	67	2/94	A	Chicopee	IC Engine	CO	421	0.4400	185	5.25	1,012	11.25	444.0	3,272	6.439	2.920	0.5725	0.557	A	Lean combs.; EPA M. 7E; Fuel flow estimated via carbon balance.
47	64	7/91	B	Johnston	IC Engine	CO	590	0.5260	310	8.78	1,012	18.83	466.0	4,580	9.460	4.290	0.5024	0.489	A	Lean combs.; EPA M. 7E; Fuel flow estimated via carbon balance.
67	101	3/88	C	Toyon Canyon	IC Engine	CO	714	0.5220	373	10.55	1,012	22.63	366.0	5,690	9.231	4.186	0.4079	0.397	A	CO analyzed by TCA method; Exhaust flow estimated via carbon balance.
64	98	12/90	D	Bakersfield	IC Engine	CO	784	0.4312	338	9.57	1,012	20.51	348.2	5,586	8.621	3.910	0.4203	0.409	A	CARB Method 1-100.
65	99	4/91	E	Otay	IC Engine	CO	588	0.5350	315	8.91	1,012	19.10	354.9	4,791	7.537	3.418	0.3946	0.384	B	Method not specified; Exhaust flow estimated via carbon balance.
	Nitrogen Oxides																			
47	64	7/91	B	Johnston	IC Engine	NOx	590	0.5260	310	8.78	1,012	18.83	86.0	4,580	2.868	1.301	0.1523	0.148	A	Lean comb.; EPA M. 10; Fuel flow estimated via carbon balance.
67	101	3/88	C	Toyon Canyon	IC Engine	NOx	714	0.5220	373	10.55	1,012	22.63	453.0	5,690	18.769	8.512	0.8294	0.807	A	NOx analyzed by Phenoldisulfonic Acid (PDSA) method; Exhaust flow estimated via carbon balanc
64	98	12/90	D	Bakersfield	IC Engine	NOx	784	0.4312	338	9.57	1,012	20.51	141.2	5,586	5.743	2.605	0.2800	0.272	A	Lean comb.; CARB 1-100.
65	99	2/91	E	Otay	IC Engine	NOx	588	0.5350	315	8.91	1,012	19.10	160.0	4,791	5.582	2.531	0.2922	0.284	B	Method not specified; Exhaust flow estimated via carbon balance.
50	67	2/94	A	Chicopee	IC Engine	NOx	421	0.4400	185	5.25	1,012	11.25	72.8	3,272	1.734	0.787	0.1542	0.150	A	Lean combs.; EPA M. 10; Fuel flow estimated via carbon balance.
51	68	2/94	F	Richmond	IC Engine	NOx	330	0.5600	185	5.23	1,012	11.22	65.8	3,522	1.688	0.765	0.1504	0.146	A	EPA M. 7E; Fuel flow estimated via carbon balance.
	Particulate Matter																			
64	98	12/90	D	Bakersfield	IC Engine	PM	784	0.4312	338	9.57	1,012	20.51	0.020	5586.0	0.977	0.443	0.0476	0.046	B	EPA Method 5.
65	99	4/91	E	Otay	IC Engine	PM	588	0.5350	315	8.91	1,012	19.10	0.003	4791.0	0.123	0.056	0.0064	0.006	D	no supporting data; excluded from EF derivation.

Summary Statistics (kg/hr/m^3/min)

IC Engines

Carbon Monoxide		**Oxides of Nitrogen**		**Particulate Matter**
Mean	0.4469	Mean	0.3012	n/a
Standard Erro	0.0330	Standard Erro	0.1044	
Median	0.4087	Median	0.2111	
Standard Dev	0.0738	Standard Dev	0.2557	
Sample Varia	0.0054	Sample Varia	0.0654	
Kurtosis	-0.7038	Kurtosis	4.7038	
Skewness	0.9993	Skewness	2.1226	
Range	0.1730	Range	0.6603	
Minimum	0.3837	Minimum	0.1463	
Maximum	0.5567	Maximum	0.8065	
Sum	2.2344	Sum	1.8074	
Count	5.0000	Count	6.0000	
Confidence Le	0.0916	Confidence Le	0.2683	
Normality test	p<0.2	Normality test	p<0.05	
		Normality test	p>0.2	
		Geometric Me	0.2424	

Carbon Monoxide	**Oxides of Nitrogen**	**Particulate Matter**
Data Points	**Data Points**	**Data Points**
0.5567	0.1481	One valid data point = 0.046
0.4886	0.8065	
0.3967	0.2723	
0.4087	0.2842	
0.3837	0.1499	
	0.1463	

AP-42 Ref.	BID Ref.	Date mo/yr	Landfill ID	Device ID	LFG Fuel Flow Rate (scfm)	Methane Fraction	Methane Flow Rate (m^3/min)	Outlet Flow Rate (dscfm)	Emission Factor (lbs/mmBtu)	Emission Factor (kg/hr/m^3/min)	EF Rating	Comments
		Carbon Monoxide										
46	63	12/93	A	Gas Turbine	945	0.5320	14.24	30,155	0.1673	0.163	A	EPA Method 3; Used in EF derivation
48	66	8/89	B	Gas Turbine (#1)	1222	0.5840	20.21	26,974	0.0914	0.089	C	EPA Method 10
48	66	8/89	B	Gas Turbine (#2)	1002	0.5840	16.57	26,662	0.1125	0.109	C	EPA Method 10
48	66	8/89	B	Gas Turbine (#3)	1244	0.5840	20.57	26,429	0.0792	0.077	C	EPA Method 10
				Site B Average					0.094	0.092		Calc. EF's slightly higher than those reported; site avg. Used in EF derivation.
68	102	5/90	C	Gas Turbine (#1)	1852	0.3395	17.80	30,559	0.1071	0.104	D	Summary Data Only
68	102	12/90	C	Gas Turbine (#1)	1751	0.4050	20.08	30,012	0.0955	0.093	D	Summary Data Only
68	102	8/91	C	Gas Turbine (#1)	1195	0.4255	14.40	28,684	0.1062	0.103	D	Summary Data Only
68	102	10/92	C	Gas Turbine (#1)	1522	0.4290	18.49	29,625	0.1225	0.119	D	Summary Data Only
68	102	9/93	C	Gas Turbine (#1)	1475	0.4395	18.36	27,450	0.1452	0.141	D	Summary Data Only
68	102	3/95	C	Gas Turbine (#1)	1481	0.4520	18.96	30,895	0.1279	0.124	D	Summary Data Only
68	102	11/95	C	Gas Turbine (#1)	1902	0.4005	21.57	30,748	0.1656	0.161	D	Summary Data Only
				Turbine Average					0.1243	0.121		Used in EF derivation.
68	102	9/93	C	Gas Turbine (#2)	1215	0.4380	15.07	20,180	1.5750	1.532	D	Summary Data Only
68	102	11/94	C	Gas Turbine (#2)	1311	0.4325	16.06	21,151	1.3370	1.300	D	Summary Data Only
				Turbine Average					1.4560	1.416		Used in EF derivation.
				Site C Average					0.790	0.768		
		Nitrogen Oxides										
46	63	12/93	A	Gas Turbine	945	0.5320	14.24	30,155	0.0282	0.027	A	EPA Method 22; Used in EF derivation.
49	66	7/89	B	Gas Turbine (#1)	1128	0.4140	13.22	26,974	0.1401	0.136	A	EPA M. 20
49	66	7/89	B	Gas Turbine (#2)	791	0.4140	9.27	26,662	0.1992	0.194	A	EPA M. 20
49	66	7/89	B	Gas Turbine (#3)	824	0.4140	9.66	26,429	0.1828	0.178	A	EPA M. 20
				Site B Average					0.174	0.169		Used in EF derivation.
68	102	5/90	C	Gas Turbine (#1)	1852	0.3395	17.80	30,559	0.1195	0.116	D	Summary Data Only
68	102	12/90	C	Gas Turbine (#1)	1751	0.4050	20.08	30,012	0.1030	0.100	D	Summary Data Only
68	102	8/91	C	Gas Turbine (#1)	1195	0.4255	14.40	28,684	0.1475	0.143	D	Summary Data Only
68	102	10/92	C	Gas Turbine (#1)	1522	0.4290	18.49	29,625	0.0963	0.094	D	Summary Data Only
68	102	9/93	C	Gas Turbine (#1)	1475	0.4395	18.36	27,450	0.1046	0.102	D	Summary Data Only
68	102	3/95	C	Gas Turbine (#1)	1481	0.4520	18.96	30,895	0.1218	0.118	D	Summary Data Only
68	102	11/95	C	Gas Turbine (#1)	1902	0.4005	21.57	30,748	0.0925	0.090	D	Summary Data Only
				Turbine Average					0.1122	0.109		Used in EF derivation.
68	102	9/93	C	Gas Turbine (#2)	1215	0.4380	15.07	20,180	0.0296	0.029	D	Summary Data Only
68	102	11/94	C	Gas Turbine (#2)	1311	0.4325	16.06	21,151	0.0248	0.024	D	Summary Data Only
				Turbine Average					0.0272	0.026		Used in EF derivation.
				Site C Average					0.070	0.068		
		Particulate Matter										
68	102	5/90	C	Gas Turbine (#1)	1852	0.3395	17.80	30,559	0.0117	0.0113	D	all but 0.0004 gr/dscf measured PM was inorganic
68	102	12/90	C	Gas Turbine (#1)	1751	0.4050	20.08	30,012	0.0102	0.0099	D	all measured PM was inorganic
68	102	8/91	C	Gas Turbine (#1)	1195	0.4255	14.40	28,684	0.0167	0.0163	D	all but 0.0003 gr/dscf measured PM was inorganic
68	102	10/92	C	Gas Turbine (#1)	1522	0.4290	18.49	29,625	0.0000	0.000	D	all but 0.0002 gr/dscf measured PM was inorganic
68	102	9/93	C	Gas Turbine (#1)	1475	0.4395	18.36	27,450	0.0000	0.000	D	all measured PM was inorganic
68	102	3/95	C	Gas Turbine (#1)	1481	0.4520	18.96	30,895	0.0208	0.0203	D	all measured PM was inorganic
68	102	11/95	C	Gas Turbine (#1)	1902	0.4005	21.57	30,748	0.0313	0.0305	D	all measured PM was inorganic
				Turbine Average					0.0130	0.0126		Used in EF derivation.
68	102	7/90	C	Gas Turbine (#2)	1398	0.4380	17.34	20,415	0.0184	0.0178	D	all measured PM was inorganic
68	102	11/91	C	Gas Turbine (#2)	1301	0.4095	15.09	22,937	0.0249	0.0242	D	all but 0.001 gr/dscf of PM measured was inorganic
68	102	9/93	C	Gas Turbine (#2)	1215	0.4380	15.07	20,180	0.0482	0.0469	D	all but 0.001 gr/dscf of PM measured was inorganic
68	102	11/94	C	Gas Turbine (#2)	1311	0.4325	16.06	21,151	0.0321	0.0312	D	all measured PM was inorganic
				Turbine Average					0.0309	0.0300		Used in EF derivation.
				Site C Average					0.0219	0.0213		

Summary Statistics (kg/hr/m^3/min)
Gas Turbines

Carbon Monoxide		Oxides of Nitrogen		Particula
Mean	0.4479	Mean	0.0830	n/a
Standard Error	0.3230	Standard Error	0.0346	
Median	0.1418	Median	0.0682	
Standard Deviation	0.6461	Standard Deviation	0.0693	
Sample Variance	0.4174	Sample Variance	0.0048	
Kurtosis	3.9592	Kurtosis	-2.5855	
Skewness	1.9879	Skewness	0.6103	
Range	1.3242	Range	0.1428	
Minimum	0.0918	Minimum	0.0265	
Maximum	1.4160	Maximum	0.1692	
Sum	1.7914	Sum	0.3322	
Count	4.0000	Count	4.0000	
Confidence Level(95.0%)	1.0281	Confidence Level(95.0%)	0.1103	
Normality test	p<0.01	Normality test	p>0.2	
Normality test (lognormal)	p<0.1			
Geometric Mean	0.2249			

Carbon Monoxide Data Points	Oxides of Nitrogen Data Points	Particula Data
0.1627	0.0274	average of tw
0.0918	0.1692	0.0213
0.1210	0.1091	
1.4160	0.0265	
0.224890320149299		

BID Ref.	AP-42 Ref.#	Date mo/yr	Landfill Name	Control/ Utilization	Compound	Molecular Weight	> <	Control Efficiency	EF Rating	Comments
56	39	6/91	Coyote Canyon	Boiler	TGNMO (as hexane)	86	=	95.89%	C	Lacking Backup Data
					Benzene	78.12	=	67.29%	C	data point excluded
					1,2-Dichlorobenzene	98.96	=	86.52%	C	
					Perchloroethylene	165.83	=	97.42%	C	
					Toluene	92.13	=	97.59%	C	
					Xylenes	106.16	=	99.21%	C	
					Avg. Halo.			91.97%		
					Avg. Non-Halo.			88.03%		
70	53	9/93	Puente Hills	Boiler #400	Benzene	78.12	=	99.79%	D	
					Toluene	92.13	=	99.93%	D	
					Xylenes	106.16	=	99.93%	D	
						Average		99.88%		
					Perchloroethylene	165.83	>	99.96%	D	Lacking Backup Data; CE is >99.93
					Methylene Chloride	84.94	=	99.96%	D	
					Dichlorobenzene	98.96	>	99.87%	D	Lacking Backup Data; CE is >99.75
						Average		99.93%		
102	68	11/95	Puente Hills	Boiler #300	Benzene	78.12	=	99.86%	D	
					Toluene	92.13	=	99.90%	D	
					Xylenes	106.16	>	99.97%	D	Lacking Backup Data; CE is >99.95
						Average		99.91%		
					Perchloroethylene	165.83	>	99.81%	D	
					Methylene Chloride	84.94	=	99.40%	D	
					Dichlorobenzene	98.96		ND	ND	
						Average		66.41%		
102	68	12/92	Palos Verdes	Boiler #1	TGNMO (as hexane)	86	=	99.08%	D	Lacking Backup Data
					Benzene	78.12	=	99.99%	D	
					Toluene	92.13	>	99.99%	D	Lacking Backup Data; CE is >99.98
					Xylenes	106.16	=	99.99%	D	Lacking Backup Data; CE is >99.99
						Average		99.99%		
					Perchloroethylene	165.83	>	99.90%	D	Lacking Backup Data; CE is >99.80
					Methylene Chloride	84.94	>	99.79%	D	Lacking Backup Data; CE is >99.59
					Dichlorobenzene	98.96	>	99.97%	D	Lacking Backup Data; CE is >99.94
						Average		99.89%		
102	68	12/94	Palos Verdes	Boiler #1	TGNMO (as hexane)	86	>	99.83%	D	Lacking Backup Data; CE is >99.83
				Boiler Average				99.46%		
102	68	11/93	Palos Verdes	Boiler #2	TGNMO (as hexane)	86	=	99.02%	D	Lacking Backup Data
102	68	12/95	Palos Verdes	Boiler #2	TGNMO (as hexane)	86	=	99.56%	D	Lacking Backup Data
					Benzene	78.12	>	99.90%	D	
					Toluene	92.13	>	99.87%	D	
					Xylenes	106.16	>	99.96%	D	
						Average		99.91%		
					Perchloroethylene	165.83	=	98.90%	D	Lacking Backup Data; CE is >99.69
					Methylene Chloride	84.94	=	98.29%	D	Lacking Backup Data; CE is >99.69
					Dichlorobenzene	98.96	=	99.88%	D	Lacking Backup Data; CE is >99.78
						Average		99.02%		
								99.29%		
					Benzene	78.12	=	99.36%	D	
					Toluene	92.13	=	99.99%	D	
					Xylenes	106.16	=	100.00%	D	Lacking Backup Data; CE is >99.99
						Average		99.78%		
					Perchloroethylene	165.83	>	99.99%	D	Lacking Backup Data; CE is >99.98
					Methylene Chloride	84.94	=	100.00%	D	Lacking Backup Data; CE is >100.00
					Dichlorobenzene	98.96		ND	ND	
						Average		66.66%		
102	68	8/91	Spadra	Boiler	TNMHC (as hexane)	86	=	99.42%	D	Lacking Backup Data
102	68	8/92	Spadra	Boiler	TNMHC (as hexane)	86	=	99.37%	D	Lacking Backup Data
102	68	9/93	Spadra	Boiler	TNMHC (as hexane)	86	>	99.67%	D	Lacking Backup Data; CE is >99.67
102	68	12/94	Spadra	Boiler	TNMHC (as hexane)	86	>	99.72%	D	Lacking Backup Data; CE is >99.72
102	68	12/95	Spadra	Boiler	TNMHC (as hexane)	86	=	94.99%	D	Lacking Backup Data
								98.64%		
			Overall Boiler Average NMOC CE					98.00%		
			Overall Boiler Halo CE					87.31%		
			Overall Boiler Non-Halo CE					97.92%		

BID Ref.	AP-42 Ref.#	Date mo/yr	Landfill Name	Control/ Utilization	Compound	Molecular Weight	> <	Control Efficiency	EF Rating	Comments
				Gas Turbine (#1)	Average			0.00%		
				Gas Turbine (#2)	Average			0.00%		
102	68	5/90	Puente Hills	Gas Turbine (#1)	Benzene	78.12	=	99.07%	D	
102	68	9/93	Puente Hills	Gas Turbine (#1)	Benzene	78.12	=	97.48%	D	
								98.28%		
102	68	7/90	Puente Hills	Gas Turbine (#2)	Benzene	78.12	=	96.88%	D	
102	68	11/91	Puente Hills	Gas Turbine (#2)	Benzene	78.12	=	96.56%	D	
102	68	9/93	Puente Hills	Gas Turbine (#2)	Benzene	78.12	=	97.55%	D	
102	68	11/94	Puente Hills	Gas Turbine (#2)	Benzene	78.12	=	98.39%	D	
								97.34%		
								97.81%		
				Gas Turbine (#1)	Dichlorobenzene	98.96	=	98.35%	D	Lacking Backup Data
				Gas Turbine (#2)	Dichlorobenzene	98.96	>	99.89%	D	Lacking Backup Data; CE is >99.82
								99.12%		
				Gas Turbine (#1)	Methylene Chloride	84.94	>	99.97%	D	Lacking Backup Data; CE is >99.93
102	68	3/95	Puente Hills	Gas Turbine (#1)	Methylene Chloride	106.16	=	98.48%	D	
								99.22%		
				Gas Turbine (#2)	Methylene Chloride	84.94	>	99.97%	D	Lacking Backup Data; CE is >99.95
102	68	9/93	Puente Hills	Gas Turbine (#2)	Methylene Chloride	84.94	=	99.91%	D	
								99.94%		
								99.58%		
				Gas Turbine (#1)	Perchloroethylene	165.83	>	99.95%	D	Lacking Backup Data; CE is >99.89
				Gas Turbine (#2)	Perchloroethylene	165.83	=	99.95%	D	Lacking Backup Data; CE is >99.91
								99.95%		
102	68	9/93	Puente Hills	Gas Turbine (#1)	TGNMO (as hexane)	86	=	95.57%	D	
102	68	3/95	Puente Hills	Gas Turbine (#1)	TGNMO (as hexane)	86	>	99.32%	D	TGNMO were ND in exhaust (<1ppm), so CE is >99.32%
102	68	11/95	Puente Hills	Gas Turbine (#1)	TGNMO (as hexane)	86	=	99.03%	D	
102	68	5/90	Puente Hills	Gas Turbine (#1)	TNMHC (as hexane)	86	>	99.55%	D	All Ref. 102 Tests are lacking backup data; summary data only; Eff is >99.95%
102	68	12/90	Puente Hills	Gas Turbine (#1)	TNMHC (as hexane)	86	=	94.75%	D	
102	68	8/91	Puente Hills	Gas Turbine (#1)	TNMHC (as hexane)	86	=	96.77%	D	
102	68	10/92	Puente Hills	Gas Turbine (#1)	TNMHC (as hexane)	86	=	95.86%	D	
								97.26%		
102	68	11/91	Puente Hills	Gas Turbine (#2)	TNMHC (as hexane)	86	=	90.09%	D	
102	68	9/93	Puente Hills	Gas Turbine (#2)	TGNMO (as hexane)	86	=	92.93%	D	
								91.51%		
				Gas Turbine (#1)	Toluene	92.13	=	95.62%	D	
102	68	12/90	Puente Hills	Gas Turbine (#1)	Toluene	92.13	=	99.92%	D	
102	68	8/91	Puente Hills	Gas Turbine (#1)	Toluene	92.13	=	99.89%	D	
102	68	10/92	Puente Hills	Gas Turbine (#1)	Toluene	92.13	=	99.83%	D	
								98.81%		
				Gas Turbine (#2)	Toluene	92.13	=	99.06%	D	
102	68	11/91	Puente Hills	Gas Turbine (#2)	Vinyl Chloride	62.5	=	99.12%	D	
				Gas Turbine (#1)	Xylenes	106.16	=	98.42%	D	
102	68	10/92	Puente Hills	Gas Turbine (#1)	Xylenes	106.16	=	99.97%	D	Eff is >99.97
								99.19%		
				Gas Turbine (#2)	Xylenes	106.16	=	99.93%	D	
								99.56%		
				Gas Turbine (#1)	halo	Average		99.17%		
				Gas Turbine (#1)	nonhalo	Average		98.76%		
				Gas Turbine (#2)	halo	Average		99.34%		
				Gas Turbine (#2)	nonhalo	Average		98.78%		
				Overall	halo	Average		99.26%		
				Overall	nonhalo	Average		98.77%		
				Overall	NMOC	Average		94.39%		

NOTES: NOTE: For the LACSD Ref. 102 data, only CE data for which detectable concs. at the inlet are presented (for non-detects at the exhaust 0.5 x the detect limits are assumed). Multiple data points were used for compounds where a wide range of CE's were observed (I.e., >1.0%).

BID Ref.	Date mo/yr	Landfill ID	Device ID	Compound	> <	Average D.E. (%)	Flare Average (%)	Site Average (%)	Comments
	NMOC								
102	3/92	A	Flare (#1)		=	99.40	99.40	99.28	
102	2/91	A	Flare (#3)		>	99.97	99.97		
102	10/91	A	Flare (#4)		=	97.27	98.60		
102	5/96	A	Flare (#4)		>	99.92			
102	12/94	A	Flare (#5)		>	99.80	99.85		
102	9/90	A	Flare (#5)		>	99.90			
102	11/93	A	Flare (#6)		=	97.37	98.58		
102	9/90	A	Flare (#6)		=	99.78			
102	8/92	B	Flare (#1)		=	99.48	99.65	99.09	
102	9/94	B	Flare (#1)		=	99.66			
102	5/96	B	Flare (#1)		=	99.80			
102	7/90	B	Flare (#2)		=	99.67	99.26		
102	7/93	B	Flare (#2)		=	98.30			
102	5/96	B	Flare (#2)		>	99.80			
102	8/92	B	Flare (#3)		=	98.73	99.18		
102	6/95	B	Flare (#3)		>	99.63			
102	8/92	B	Flare (#4)		=	99.23	99.44		
102	6/95	B	Flare (#4)		>	99.64			
102	7/90	B	Flare (#5)		=	99.56	99.01		
102	7/93	B	Flare (#5)		=	97.80			
102	6/95	B	Flare (#5)		=	99.67			
102	8/92	B	Flare (#6)		=	99.41	99.54		
102	6/95	B	Flare (#6)		>	99.66			
102	7/93	B	Flare (#7)		=	97.30	98.50		
102	5/96	B	Flare (#7)		>	99.70			
102	11/91	B	Flare (#9)		=	98.29	98.57		
102	9/94	B	Flare (#9)		>	98.84			
102	11/91	B	Flare (#10)		>	98.98	99.23		
102	11/94	B	Flare (#10)		=	99.47			
102	9/94	B	Flare (#11)		=	99.40	99.40		
102	11/91	B	Flare (#12)		=	98.20	98.27		
102	7/93	B	Flare (#12)		=	96.90			
102	5/96	B	Flare (#12)		>	99.70			
102	1/94	C	Flare (#1)		=	98.90	98.90	99.33	
102	10/91	C	Flare (#2)		=	99.15	99.38		
102	2/92	C	Flare (#2)		=	99.20			
102	5/95	C	Flare (#2)		>	99.80			
102	2/92	C	Flare (#3)		=	99.60	99.70		
102	5/95	C	Flare (#3)		>	99.80			
102	8/90	C	Flare (#5)		>	99.79	99.39		
102	1/94	C	Flare (#5)		=	98.99			
102	10/91	C	Flare (#6)		=	99.21	99.26		
102	3/93	C	Flare (#6)		=	99.06			

Column1	
Mean	98.4335
Standard	0.632821
Median	99.09273
Mode	NA
Standard	1.415031
Sample V.	2.002312
Kurtosis	3.867357
Skewness	-1.95888
Range	3.354333
Minimum	95.97167
Maximum	99.326
Sum	492.1675
Count	5
Confidenc	1.756996

102	4/96	C	Flare (#6)	=	99.50		
102	3/93	D	Flare (#1)	=	99.20	99.45	99.31
102	3/95	D	Flare (#1)	>	99.70		
102	3/93	D	Flare (#2)	=	97.10	97.10	
102	2/91	D	Flare (#3)	=	99.42	99.54	
102	2/92	D	Flare (#3)	=	99.50		
102	3/95	D	Flare (#3)	>	99.70		
102	3/90	D	Flare (#4)	>	99.99	99.66	
102	2/92	D	Flare (#4)	=	99.50		
102	3/95	D	Flare (#4)	=	99.50		
102	3/90	D	Flare (#5)	=	99.20	99.15	
102	3/93	D	Flare (#5)	=	99.10		
102	3/90	D	Flare (#6)	>	99.70	99.43	
102	2/94	D	Flare (#6)	=	98.80		
102	3/96	D	Flare (#6)	=	99.78		
102	2/91	D	Flare (#7)	>	99.93	99.74	
102	7/95	D	Flare (#7)	=	99.54		
102	3/96	D	Flare (#8)	=	99.84	99.84	
102	3/96	D	Flare (#9)	=	99.84	99.84	
102	10/90	E	Flare (#2)	>	99.66	97.44	98.50
102	2/93	E	Flare (#2)	=	98.56		
102	8/95	E	Flare (#2)	=	94.10		
102	10/90	E	Flare (#3)	>	99.75	99.33	
102	5/94	E	Flare (#3)	=	98.90		
102	10/90	E	Flare (#4)	>	99.69	96.69	
102	2/93	E	Flare (#4)	=	96.57		
102	8/95	E	Flare (#4)	=	93.80		
102	5/91	E	Flare (#5)	=	99.01	98.71	
102	5/94	E	Flare (#5)	=	98.40		
102	12/91	E	Flare (#6)	=	99.21	99.10	
102	2/93	E	Flare (#6)	=	98.50		
102	3/95	E	Flare (#6)	=	99.59		
102	5/91	E	Flare (#7)	=	99.36	98.53	
102	5/94	E	Flare (#7)	=	97.70		
102	2/93	E	Flare (#8)	=	97.18	98.34	
102	3/95	E	Flare (#8)	>	99.50		
102	6/90	E	Flare (#9)	>	99.60	98.80	
102	5/94	E	Flare (#9)	=	98.00		
102	6/90	E	Flare (#10)	>	99.66	99.37	
102	12/93	E	Flare (#10)	=	98.90		
102	3/95	E	Flare (#10)	=	99.56		
102	6/90	E	Flare (#11)	>	99.71	99.46	
102	5/92	E	Flare (#11)	=	99.21		
102	2/96	E	Flare (#11)	=	99.46		
102	6/90	E	Flare (#12)	>	99.65	99.50	
102	12/93	E	Flare (#12)	=	99.20		

102	3/95	E	Flare (#12)		>	99.65			
102	7/90	E	Flare (#13)		>	99.78	99.43		
102	5/92	E	Flare (#13)		=	98.88			
102	2/96	E	Flare (#13)		>	99.64			
102	7/90	E	Flare (#14)		=	97.33	98.39		
102	12/93	E	Flare (#14)		=	99.44			
102	7/90	E	Flare (#15)		=	98.24	98.93		
102	2/96	E	Flare (#15)		>	99.62			
102	7/90	E	Flare (#16)		=	97.91	98.47		
102	12/93	E	Flare (#16)		=	99.02			
102	5/91	E	Flare (#17)		=	97.80	98.25		
102	5/92	E	Flare (#17)		=	98.70			
102	12/91	E	Flare (#18)		=	99.27	97.13		
102	11/92	E	Flare (#18)		=	99.32			
102	8/95	E	Flare (#18)		=	92.80			
102	5/91	E	Flare (#19)		=	99.21	99.00		
102	5/92	E	Flare (#19)		=	98.79			
102	12/91	E	Flare (#20)		=	98.98	99.15		
102	11/92	E	Flare (#20)		>	99.32			
102	12/91	E	Flare (#22)		=	99.08	98.54		
102	11/92	E	Flare (#22)		=	97.99			
102	10/90	E	Flare (#24)		>	99.68	95.94		
102	10/92	E	Flare (#24)		=	98.15			
102	8/95	E	Flare (#24)		=	90.00			
104	12/94	F	Flare		=	99.00	99.00	99.00	
105	10/93	G	Flare		>	99.98	99.98	99.98	
106	4/96	H	Flare		=	99.80	99.80	99.80	EF rating downgraded primarily due to NOx emissions data.
107	10/96	I	Flare		>	99.13	99.13	99.13	
108	11/93	J	Flare		>	98.46	98.46	98.46	
109	3/94	K	Flare		>	99.70	99.70	99.70	
55	8/90	N	Flare		>	84.50			
59	8/90	O	Flare		>	97.70			
60	5/90	P	Flare		=	99.60			
62	4/92	Q	Flare		>	92.05			
	Individual Species								
102	12/94	A	Flare (#5)	Benzene	>	99.98			Lacking Backup Data.
				Toluene	>	99.98			
				Xylenes	>	99.98			Lacking Backup Data.
				Average					
				Perchloroethylene	>	99.00			Lacking Backup Data.
				Methylene Chloride		N/A			not detected at inlet.
				Dichlorobenzene	>	99.39			Lacking Backup Data.
				Average					
102	7/93	B	Flare (#2)	Benzene	>	99.90			Lacking Backup Data.
				Toluene	>	99.98			Lacking Backup Data.

				Xylenes	>	99.94	Lacking Backup Data.
				Average			
				Perchloroethylene	=	99.96	
				Methylene Chlori	>	99.98	Lacking Backup Data.
				Dichlorobenzene	>	99.04	Lacking Backup Data.
				Average			
102	2/92	C	Flare (#3)	Benzene	>	99.90	Lacking Backup Data.
				Toluene	>	99.90	
				Xylenes	>	99.90	Lacking Backup Data.
				Average			
				Perchloroethylene	>	99.90	Lacking Backup Data.
				Methylene Chlori	>	99.90	Lacking Backup Data.
				Dichlorobenzene		N/A	Inlet and outlet concentrations were not detected.
				Average			
102	2/92	D	Flare (#4)	Benzene	>	99.51	Lacking Backup Data.
				Toluene	>	99.98	Lacking Backup Data.
				Xylenes	>	99.98	Lacking Backup Data.
				Average			
				Perchloroethylene	=	99.92	
				Methylene Chlori	>	99.99	Lacking Backup Data.
				Dichlorobenzene	>	99.22	Lacking Backup Data.
				Average			
	5/90	E	Flare (#9)	Benzene	=	99.57	
				Toluene	=	99.86	
				Xylenes	>	99.88	Lacking Backup Data.
				Average			
				Perchloroethylene	=	99.89	
				Methylene Chlori	>	99.96	Lacking Backup Data.
				Dichlorobenzene	>	99.23	Lacking Backup Data.
				Average			
	3&4/1992	L	Flare	Benzene	=	38.20	
				Toluene		n/a	
				Xylenes		n/a	
				Average		not calculated	not used in emission factor development.
				Perchloroethylene	>	94.40	
				Methylene Chlori	=	91.80	
				Dichlorobenzene		n/a	
				Average	>	62.07	
	3&4/1992	M	Flare	Benzene	=	85.90	
				Toluene		n/a	
				Xylenes		n/a	
				Average	=	28.63	
				Perchloroethylene	>	98.40	
				Methylene Chlori	>	90.50	

			Dichlorobenzene		n/a	
			Average	>	62.97	
8/90	N	Flare	Benzene	>	98.72	
			Toluene	=	99.94	
			Xylenes	>	99.89	
			Average	=	99.52	
			Perchloroethylene	>	98.17	
			Methylene Chloride		n/a	test results not used (-73% DE)
			Dichlorobenzene		n/a	
			Average	>	32.72	
8/90	O	Flare	Benzene	>	83.40	
			Toluene	=	99.80	
			Xylenes	>	99.40	
			Average	>	94.20	
			Perchloroethylene	>	98.90	
			Methylene Chloride		n/a	test results not used (-54% DE)
			Dichlorobenzene		n/a	
			Average	>	32.97	

BID Ref.	Date mo/yr	Device ID	Compound	> <	Average CE (%)	EF Rating	Comments
98	Dec-90	IC Engine	Methane	=	97.80	B	
			Ethane	=	98.33	B	
			Propane	=	90.46	B	
			Butane	=	94.53	B	
			Pentane	>	98.34	B	
			NMOC	=	97.13	B	
99	Apr-91	IC Engine	NMOC	=	94.59	C	
100	Feb-88	IC Engine	NMOC	=	99.74	D	
			Trichloroethylene	=	98.93	D	
			Perchloroethylene	=	99.41	D	
			Methane	=	94.06	D	
101	Mar-88	IC Engine					
			Benzene	=	25.00	D	data point excluded
			Toluene	=	96.67	D	
			Xylene	=	99.22	D	
			Trichloroethylene	=	94.00	D	
			1,1,1-Trichloroethylene	=	90.00	D	
			Perchloroethylene	=	95.00	D	
			Methane	=	62.12	D	
			Avg. NMOC		97.15		
			Avg. All (non-methane) Species		89.99		
			Avg. Halo Species		95.47		
			Avg. Non-Halo Species		86.08		

DERIVATION OF CHLORIDE CONTENT

Compound	Molecular Weight	Default Concentration (ppmv)	Moles of Chloride Produced	Individual Chloride Concentrations
1,1,1-Trichloroethane (methyl chloroform)*	133.42	0.48	3	0.38
1,1,2,2-Tetrachloroethane*	167.85	1.11	4	0.93
1,1,2-Trichloroethane*	133.42	0.10	3	0.08
1,1-Dichloroethane (ethylidene dichloride)*	98.95	2.35	2	1.66
1,1-Dichloroethene (vinylidene chloride)*	96.94	0.20	2	0.14
1,2-Dichloroethane (ethylene dichloride)*	98.96	0.41	2	0.29
1,2-Dichloropropane (propylene dichloride)*	112.98	0.18	2	0.11
Bromodichloromethane	163.87	3.13	2	1.34
Carbon tetrachloride*	153.84	0.004	4	0.004
Chlorobenzene*	112.56	0.25	1	0.08
Chlorodifluoromethane	86.47	1.30	1	0.53
Chloroethane	64.52	1.25	1	0.68
Chloroform*	119.39	0.04	3	0.04
Chloromethane	50.49	1.21	1	0.84
Dichlorobenzene**	147.00	0.21	2	0.10
Dichlorodifluoromethane	120.91	15.70	2	9.09
Dichlorofluoromethane	102.92	2.62	2	1.78
Dichloromethane	84.94	14.30	2	11.78
Fluorotrichloromethane	137.38	0.76	3	0.58
Perchloroethylene (tetrachloroethylene)*	165.83	3.73	4	3.15
Trichloroethylene (trichloroethene)*	131.40	2.82	3	2.25
t-1,2-dichloroethene	96.94	2.84	2	2.05
Vinyl chloride*	62.50	7.34	1	4.11
Total Chloride Concentration				41.99